

46d U113
4 Tech TM 1944
TM 5-3272

U.S. Dept of Army
TRACTOR, CRAWLER,

DIESEL,

55 to 60-DBHP, STANDARD,

INTERNATIONAL TD-14,

74-inch GAGE



MAINTENANCE INSTRUCTIONS AND PARTS CATALOG

APRIL 1944

TracTractor Model TD-14

OPERATIONS SECTION

Each section has a black tab which lines up with the corresponding section name and number shown at the right.

The black tabs are quickly located by bending this book back.

INTERNATIONAL HARVESTER COMPANY
180 NORTH MICHIGAN AVE. CHICAGO 1, ILLINOIS, U.S.A.

GENERAL
DRIVING INSTRUCTIONS

6

BRAKES
(STEERING)

1

CHASSIS

2

CLUTCHES

3

COOLING SYSTEM

4

ELECTRICAL
AND MAGNETO

5

ENGINE

6

FUEL SYSTEM

7

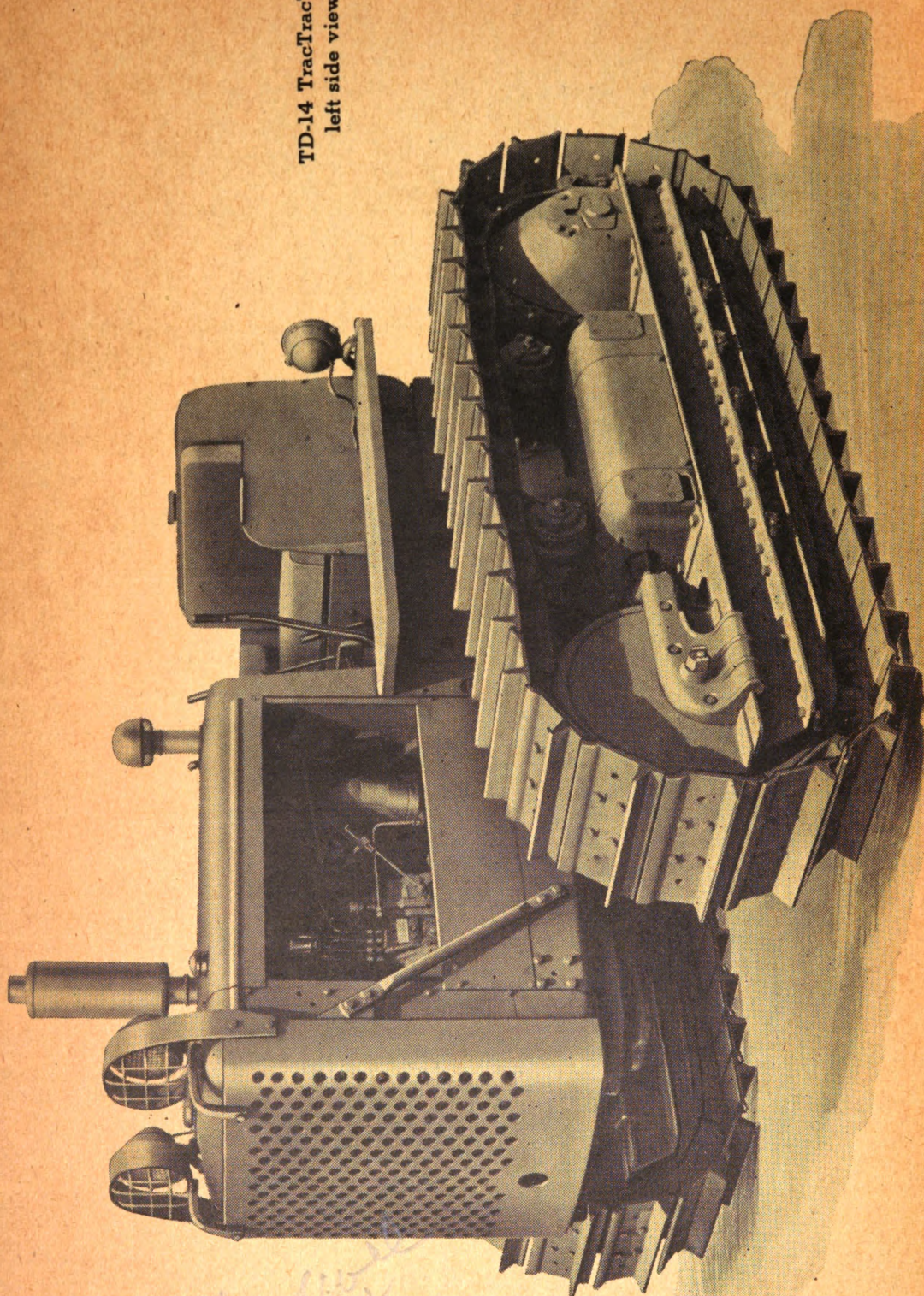
LUBRICATION

8

TRACKS

9

TD-14 TracTracTor,
left side view.



SPECIFICATIONS

TMS: 3212
1944

CAPACITIES (U.S. Measure)

Fuel tank	Approx. 45	gals.
Gasoline tank	1½	gals.
Water cooling system.	20	gals.
Transmission.	24	qts.
Sprocket drive cases (each side).	5	pints
Crankcase pan	16	qts.
Injection pump (Bosch).	3/8	pint
Air cleaner oil cup	5½	pints

ENGINE (Diesel Type)

Cylinders	4
Bore.	4-3/4 in.
Stroke.	6-1/2 in.
Engine speed (governed) (full load)	1350 R.P.M.
Fuel injection pump	Bosch
Carburetor (Dual Manifold Starting)	IHC
Magneto with impulse coupling	IHC Type H-4
Spark plug gap. . . . .	.035 in. to .040 in.
Valve clearance (engine hot). . . . .	.018 in.

ENGINE CLUTCH

Over-center type (hand-controlled). 15 in.

STEERING CLUTCH

Multiple dry disc - spring-loaded type with manual release 15 in.

BRAKES

External contracting on steering clutch drums 17 in.

TRACK

Tread	74 in.
Ground contact length (normal).	78-5/8 in.
Track shoe width	18 in.

TRANSMISSION

Six speeds forward - M.P.H. } Two speeds reverse - M.P.H. }	Low	1-1/2
	Second.	2
	Third	2-1/2
	Fourth.	3-3/8
	Fifth	4-3/4
	High	5-3/4
	Low - Reverse	1-1/2
	Hi - Reverse.	3-3/8

GENERAL

Length (overall)	136 in.
Width (overall).	92-1/8 in.
Height - to top of exhaust muffler (from ground line).	88-3/4 in.
Drawbar height (above ground line)	13-5/8 in.
Drawbar horizontal adjustment.	27 in.

INSTRUMENTS AND CONTROLS

(See Illust. 1)

COMPRESSION RELEASE LEVER

Pulling down on the compression release lever converts the Diesel into a gasoline engine for starting. Reduced compression, spark plug ignition, and carbureted gasoline fuel permit starting the engine as a gasoline engine. After a quick cylinder warm-up, switch the engine to Diesel operation by pushing compression release lever all the way up. Refer to page 6 for correct method of starting on gasoline and changing to Diesel operation. See page 8 for changing back to gasoline operation before stopping engine, and then place compression release lever back in Diesel position after engine is stopped.

ELECTRIC STARTER BUTTON

Pressing on this button with the foot completes the electrical circuit between the battery and the starting motor and causes the starting motor pinion to engage the flywheel ring gear, thereby cranking the engine. Stop pressing the button the moment the engine starts. Do not run the starting motor for more than 30 seconds at any one time.

CHOKE BUTTON

Helps start the engine when the engine is cold. Pulling out the rod shuts off air to the carburetor, giving a rich mixture. After the first few revolutions of the engine, push the choke button in half way, or to a point where the engine runs without missing. Push the choke all the way in after the engine has started. Do not run the engine with the choke rod out.

PRIMER BUTTON

When starting in cold weather the engine needs to be primed. A few strokes of the primer button, which sprays raw gasoline direct into the intake manifold, are usually sufficient. The number of strokes will depend on operating temperature.

LIGHT SWITCH

Controls the head and tail lamps and the battery charging rate. In its regular position at "L" it is set for low charging. Turn to first position at right, "H" for high charging rate, to second position marked "D" for dim lights, and to last position marked "B" for bright lights.

AMMETER

This is the check on the electrical system. It indicates whether the battery is being charged or discharged. When the engine is operating the needle should be in the "Charge" range. If the ammeter shows discharge continuously the cause should be investigated in order to avoid completely discharging the battery.

LUBRICATING OIL GAGE

Indicates the pounds of pressure of the oil circulating through the engine. The indicator needle should be in the white area when the engine is running. If the indicator is not in the white area, stop the engine immediately and investigate the cause of the oil pressure failure.

ENGINE SPEED CONTROL LEVER

Controls the speed of the engine, and, when set in a given position, maintains a uniform engine speed under variable loads.

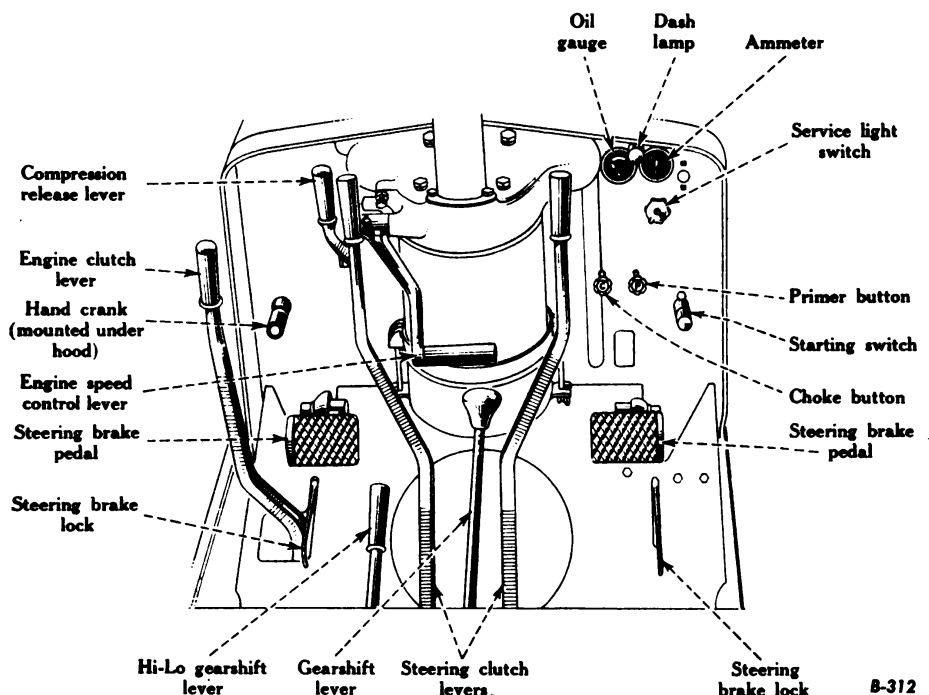
ENGINE CLUTCH LEVER

Is used to disengage the engine from the transmission. Push the engine clutch lever all the way forward to disengage the engine clutch.

GEARSHIFT LEVER

Is used to select the various gear ratios provided in the transmission. There are three forward positions and one reverse position, giving six forward speeds and two reverse by using the high and low range gearshift lever.

INSTRUMENTS AND CONTROLS - Continued



Illust. 1
Showing the Operating Controls.

HI-LO GEARSHIFT LEVER

Is used to double the range of speeds. Moving the lever forward gives the low range, and backward the high range. (See Illust. 7.)

STEERING CLUTCH LEVERS

Are used to steer the tractor. Pulling back on either steering lever releases the steering clutch and makes the track on that side inoperative. To turn left, pull on left lever. To turn right, pull on right lever.

STEERING BRAKE FOOT PEDALS

Operating the steering brakes speeds up turning the tractor. Never apply the steering brake until the steering clutch is fully released. Do not use the brake unless it is necessary to make a sharp turn.

STEERING BRAKE LOCKS

Each steering brake pedal has a locking device to hold the tractor whenever necessary. To lock either brake, push foot brake pedal down and lift up ratchet pawl, which engages in the ratchet, locking the brake pedal.

BEFORE STARTING A NEW TRACTRATOR

Make a complete inspection of the tractor for any shortage or damage which may have occurred while being shipped.

(4) Engines shipped to destinations in the United States of America, Canada and Mexico are filled with thinned SAE-10 oil when leaving the factory. For further information, see "Lubrication Guide."

LUBRICATION

(1) Lubricate the entire tractor, as indicated in the "Lubrication Guide".

(2) Check the oil levels of the engine crankcase, air cleaner, transmission case and sprocket drive gear cases to see that they are filled to the correct levels with the proper grades of oil for the prevailing temperature (refer to specifications of lubricants in the "Lubrication Guide").

(3) Tractors shipped to destinations in the United States of America, Canada, and Mexico are filled with oil in all parts before leaving the factory. However, the lubricant compartments should be checked for proper levels as outlined in previous item 2.

TRACTORS PACKED FOR EXPORT

All oil is drained from the engine crankcase, air cleaner, and from all the gear cases of the tractors packed for export.

ENGINE COOLING SYSTEM

Be sure the radiator is filled with clean water. (Use soft or rain water.) For further information see "Cooling System", Section 4. If the tractor is to be operated in freezing temperatures (32° F. or lower) refer to "Cold Weather Operations" on pages 11 and 12.

ELECTRICAL SYSTEM

Tractors are shipped with the battery ground cable disconnected at the battery end, and in addition, the connection at the "F" terminal on the generator frame is not completed. Before operating the tractor, connect the "battery to ground" cable, and connect the generator wires.

Batteries when shipped dry should be serviced as outlined on the instruction tag attached to the battery.

DIESEL FUEL SPECIFICATIONS - Do not use dirty fuel.

MARINE CORPS, ENGINEER CORPS, ORDNANCE AND AIR CORPS

Diesel fuel for high speed automotive type Diesel engines.

GRADES:

- Class A
- Class B
- Class X (Winter grade)

NOTE: Pour point must be lower

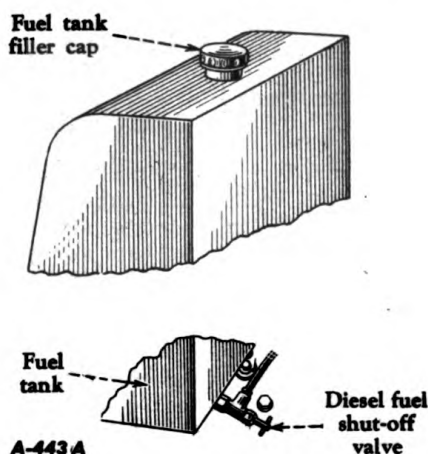
than minimum temperature at which fuel is to be used.

NAVY

Diesel fuel for automotive type Diesel engines.

NOTE: Pour point must be lower than minimum temperature at which fuel is to be used.

PREPARING THE TRACTOR FOR DAILY OPERATION

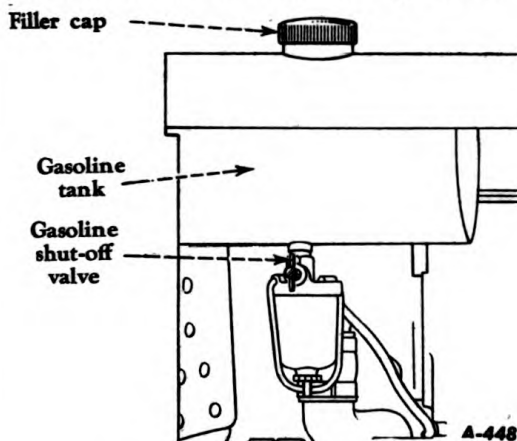


Illust. 2
Showing the Fuel Tank and Shut-off Valve.

FUEL SYSTEM

Fill the main fuel tank (capacity 45 gallons, U.S.). For fuel specifications, see page 4.

Fill the gasoline tank with a good grade of clean gasoline (capacity is approximately 1-1/2 gallons, U.S.). Carefully strain the gasoline and the Diesel fuel to be sure it is free from foreign substances. Do not use dirty fuel.



Illust. 3
Showing the Gasoline Tank and Shut-off Valve.

NOTE: Never fill the gasoline tank when near an open flame, or when the engine is running. Keep the funnel in contact with the metal of the tank when pouring in the fuel to avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline as the air within a radius of several feet is permeated with a highly explosive vapor.

COOLING SYSTEM

See that the drain cocks are closed. Remove the radiator filler cap and see that water comes up to a level slightly below the bottom of the filler opening. Replace radiator cap.

LUBRICATION

Be sure the oil in the crankcase is up to full level mark on the oil gage. See the Lubrication Guide for complete lubrication requirements.

Observe the ground under the tractor for any possible oil and lubricant leakage.

OPERATING THE DIESEL ENGINE

Four steps are necessary in operating this Diesel engine.

- (1) Starting the engine on gasoline.
- (2) Changing over to Diesel.
- (3) Changing back to gasoline before stopping the engine to facilitate next starting.
- (4) Putting the compression release lever in Diesel position after stopping the engine on gasoline (to permit starting valves to cool on their seats).

The above steps are fully explained in the following pages, please study them carefully.

TO START THE ENGINE (See Illusts. 1 and 4)

- (1) Move the gear shift lever into neutral position and disengage the engine clutch by pushing the lever all the way forward.
- (2) Pull the compression release lever down to the starting position.
- (3) Pull the engine speed control lever back to the starting position and leave it in this position until the engine is changed to Diesel operation.
- (4) Pull choke button out part way. (In cold weather, pull out all the way). Give the primer several strokes in cold weather, if necessary.
- (5) Step on starter button.
- (6) Push in choke button to where engine runs without missing and gradually push all the way in.
- (7) Check the engine oil pressure. If the gage does not indicate any pressure, stop the engine and inspect the oil system to find the cause of the failure.

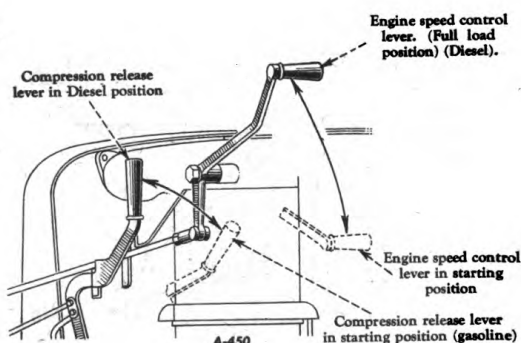
(8) The engine is now operating on the gasoline cycle and should operate approximately a minute (2 or 3 minutes in cold weather) before switching to Diesel fuel.

NOTE: If trouble is experienced in starting the engine refer to page 10 "OPERATING PRECAUTIONS". Also see "COLD WEATHER OPERATION", page 11.

TO CHANGE TO DIESEL OPERATION (See Illust. 4)

- (1) Push the compression release lever all the way forward.
- (2) Immediately advance the engine speed control lever far enough to keep the engine from stalling.
- (3) The engine will not run on the diesel cycle if there is any air in the fuel injection system. (Refer to page 4, Section 7.)

NOTE: The carburetor and magneto are cut-out and auxiliary combustion chamber is closed, isolating the spark plugs when the compression release lever is put in the "Diesel position".



Illust. 4
Engine Controls

OPERATING THE TRACTOR

SAFETY-FIRST!

Put the gearshift lever in neutral position before dismounting from the tractor.

Read and follow the "OPERATING PRECAUTIONS" on page 10.

After the tractor is in motion, extreme care should be

taken to prevent accidents and personal injuries.

Before attempting to drive the tractor, the driver should be thoroughly familiar with all the instruments and controls. See page 2 for description of all the instruments and controls.

DRIVING THE TRACTOR

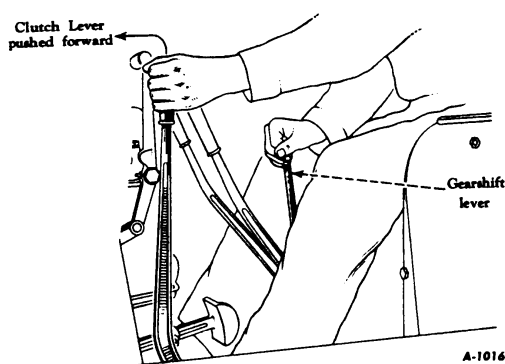
(See Illusts. 5, 6 and 7)

When the engine has been running long enough to warm up, set the engine speed control lever in the idling position (lever slightly up from the lowest position). Disengage the engine clutch by pushing the engine clutch control lever (on left hand side) forward as far as it will go. Continue to press forward on the clutch lever to apply the clutch brake, until the clutch stops turning, then carefully move the gear shift lever to the speed desired.

After putting the transmission gears in mesh, advance the engine speed (by raising engine speed control lever) enough to keep the engine from stalling, and carefully engage the engine clutch until the slack is taken up between the tractor and the load, then pull the clutch lever back until full over-center cam engagement is definitely felt.

ON A NEW TRACTOR Do not operate a new tractor immediately on a full load; run light for a reasonable length of time.

Do not overload the tractor at any time.



Illust. 5
Disengaging engine clutch
to shift gears.

GEAR SHIFTING

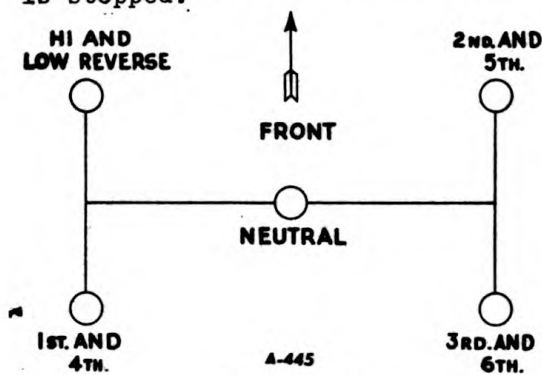
CAUTION! Do not shift gears while tractor is in motion.

Always disengage the clutch before shifting gears. (See above paragraph.)

There are three forward positions and one reverse position in the transmission giving six forward speeds and two reverse speeds by using the high and low range gear shift lever.

OPERATING THE TRACTOR - Continued

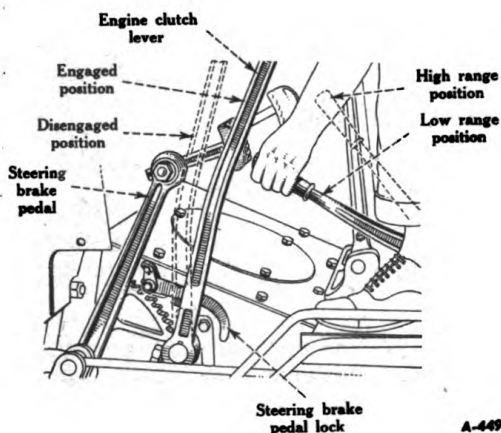
Once a speed has been selected and the tractor is in operation, further gear shifting should not be attempted until clutch is completely disengaged and the tractor is stopped.



Illust. 6
Showing the various
Gear Shifting Positions.

HI-LO RANGE

The high and low range of the transmission is controlled by the Hi-Lo gear shift lever (see Illust. 7). Moving this lever forward gives a low range, and backward a high range.



Illust. 7
Showing Hi-Lo Shifter Lever,
Engine Clutch Lever and Steering
Brake Pedals.

HI-LO RANGE - Continued

When the Hi-Lo lever is in the "down" position (forward), the tractor can be shifted with transmission gear shift lever to low-reverse, first, second, or third speeds. When the Hi-Lo lever is in the "up" position (backward), the tractor can be shifted to high-reverse, fourth, fifth, or sixth speeds.

TO STOP TRACTOR

Disengage the clutch by pushing the clutch lever forward and move the gearshift lever to neutral position. Use the brakes if necessary.

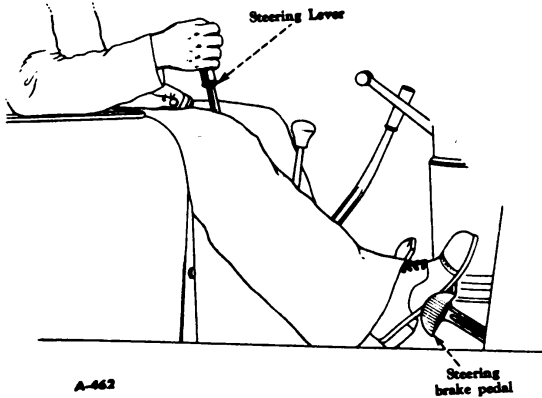
SAFETY-FIRST! Always move the gearshift lever into the neutral position when the tractor is stopped.

TO STOP ENGINE

- (1) Make sure the gasoline supply is turned on.
- (2) Retard the engine speed control lever, and at the same time, pull the compression release lever all the way back (to gasoline position).
- (3) Shut off the gasoline fuel supply at the tank (see Illust. 3) and allow the engine to use up the fuel in the carburetor.
- (4) After the engine stops on gasoline, push the compression release lever up to the "Diesel position" to permit the starting valves to cool on their seats.

STEERING THE TRACTOR

(1) To turn to the right or left pull back the steering clutch lever on the side to which the turn is to be made.



Illustr. 8
Turning to the right.

(2) To make a sharp turn, use the steering brake on the side toward which the turn is to be made. For example: To turn sharply to the right, pull back on the right hand steering clutch lever and then push down on the right steering brake pedal.

(3) If pulling back on the steering clutch lever does not turn the tractor enough, and if pushing the steering brake all the way down turns the tractor too much, press down gently on the steering brake pedal until the desired turn is made.

STEERING DOWN GRADE

(1) When going down grade with the tractor pulling the load, steering should be done in the usual manner.

(2) When going down grade, if the load is pushing the tractor, the steering clutch operation is reversed. Disengage the right steering clutch to turn left, and the left steering clutch to turn right. Do not apply the brakes.

OPERATING OVER AN OBSTRUCTION

When running over a log, ditch or bank, use the steering clutches instead of the engine clutch to slow the tractor. Both steering clutches may be released slightly until the tractor balances on the top of the obstruction. Then, engage one clutch gradually so the tractor moves forward at an angle over and down. If the load is light, it might be necessary to use the brakes.

STEERING BRAKE LOCKS

Each foot brake pedal has a locking device. To lock either brake, push in lock rod. (See Illustr. 7.)

Do not use the brake pedals as foot rests; this causes undue wear on the brake parts.

OPERATIONS SECTION

OPERATING PRECAUTIONS

(1) Do not attempt to start the engine by towing or coasting the tractor. To do so may cause serious damage to the engine and transmission.

(2) Do not run the starting motor for more than approximately 30 seconds at any one time.

(3) If trouble is experienced in starting on gasoline in cold or damp weather, the spark plugs should be removed and wiped off, removing any condensation. At the same time check the spark plug gap which should be .035" to .040". After drying the spark plugs, replace them in the engine, then start the engine in the usual manner.

(4) If it is necessary to hand crank the engine, the operator should stand in a position that will eliminate any possibility of being struck by the starting crank, if there is a reversal of the direction of the engine. Crank the engine by using quick up-strokes; *do not spin it.*

(5) **SAFETY-FIRST!** Never fill the gasoline tank when lamps are lighted, when near an open flame, or when the engine is running. Keep the funnel, used for pouring in the fuel, in contact with the metal of the tank. By so doing, you will avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline as the air within a radius of several feet is permeated with a highly explosive vapor.

See that the vent holes in the fuel and gasoline tank filler caps are kept open at all times to assure proper flow of the fuel.

(6) Do not pour cold water into the radiator if the engine is very hot, *unless conditions make it absolutely necessary.* Under such conditions, start the engine and let it idle. Then slowly pour the water into the radiator.

(7) *Do not apply the steering brake until the steering clutch is fully released or excessive heating and rapid wear of steering brakes will result.*

When pulling a load, it is not necessary to use the steering brakes except to make sharp turns; the load itself acts as a brake. *Do not use the brakes unless it is necessary to do so in order to make the required turn.*

(8) Do not ride the brake pedals as this will result in excessive wear on brake linings.

(9) Improper use of the steering brakes when making turns will cause the tractor to jerk. Try to avoid this by using the steering control lever intermittently with only a slight pressure on brake pedal when making any turn, except a pivot turn. This method of turning gives you a more even turn and does not subject the tractor to sudden impacts.

(10) The drawbar should be free to swing at all times unless it is absolutely necessary to hold it in one position.

(11) Do not shift gears while tractor is in motion.

COLD WEATHER OPERATION

If the tractor is to be operated in temperatures of 32° F. or lower, observe the following precautions:

STARTING THE ENGINE

During cold weather and when the engine is cold, set the choke valve lever nearly closed and prime the engine with the primer button.

In zero weather, give the engine 6 to 8 primes.
In temperatures 10° to 20° F., give the engine 3 to 5 primes.
In temperatures 30° to 40° F., give the engine 1 to 3 primes.

Then crank the engine in the usual manner.

FUEL SYSTEM

Use only a high-test winter-grade gasoline for starting. Keep your supply in a closed container so the more volatile portion does not evaporate.

Fill the fuel tank at the end of the day's run to prevent moisture from collecting in the tank.

LUBRICATION

Be sure to use the correct grade of lubricant in the engine crankcase, injection pump, air cleaner, magneto impulse coupling, transmission, track rollers, track idlers and sprocket drive gear case, as specified in the "Lubrication Guide."

TRACKS FROZEN TO GROUND

If your tractor is left out during cold weather and the tracks become frozen to the ground, do not attempt to jerk them loose with the power of the engine because the sudden impact, if the tracks should not break loose, may damage the tractor. Loosen the tracks before starting the tractor.

OPERATING IN WATER OR SNOW

When operating the tractor in deep water, or in snow that is in a thawing condition, lubricate the track rollers every four hours. This will flush out the water that might be forced past the seals and into the lubricant. If operating the tractor in water that is deep enough to submerge the bottom of the transmission case, inspect the lubricant in the transmission case and in the drive gear sprocket cases frequently. If any water is present, drain these cases and refill with new oil.

NOTE: When operating the tractor in water, or under extremely dusty conditions, water or dust will likely come in through the holes in the drain plugs on the engine clutch and steering clutch compartments. To avoid this take out these drain plugs and replace them with solid plugs which have no holes. Occasionally remove the plugs to allow any oil accumulation to drain out.

OPERATIONS SECTION

COLD WEATHER OPERATION - Continued

COOLING SYSTEM

When the temperature is likely to be 32° F. or lower, there is danger of the water freezing in the cooling system. To overcome this, either drain the water from the cooling system at the end of each run, or use the recommended anti-freezing solution.

IMPORTANT! Before filling the radiator in freezing weather, cover the entire radiator and start the engine; then put in the water immediately. This prevents the water from freezing during the warming up period.

TO DRAIN THE SYSTEM

(1) Open the radiator drain cock on the lower left-hand side of the radiator. (See *Illust. 3, Section 4.*)

(2) Open the drain cock in the left hand side of the crankcase. (See *Illust. 2, Section 4.*)

(3) See that the drain cocks are not clogged and that the water drains completely.

ANTI-FREEZE SOLUTIONS

The table shown below gives the quantities of anti-freeze to be added per gallon of water. To determine the total quantity necessary, multiply the capacity of the cooling system (20 U. S. gallons) by the number of pints per gallon required at the prevailing temperature.

CAUTION! Do not mix anti-freeze solutions.

Do not under any circumstances use any of the following in the cooling water as an anti-freeze.

Honey, salt, kerosene, Diesel fuel, glucose or sugar, calcium chloride or any alkaline solution.

Freezing Point (Fahrenheit)	Ethylene Glycol
	(Pints Required Per Gallon)
10°	2
0°	2-1/2
-10°	3
-20°	3-1/2
-30°	4
-40°	4-1/2
-50°	4-1/2
-60°	5
-70°	5

PERIODIC INSPECTIONS

To insure mechanical efficiency it is necessary that tractors be systematically inspected at intervals as outlined below.

AFTER 8 HOURS OF OPERATION

Point of Inspection	Remarks
Lubrication Points	See "Lubrication Guide."

AFTER 64 HOURS OF OPERATION

Point of Inspection	Remarks
*Air Cleaner Screen	Wash. }
*Air Cleaner Intake Pipe.	Clean. } (Refer to page 2, Section 6).
Flexible rubber connection between Air Cleaner and Air Intake Pipe. .	Inspect for loose fit or damage.
Diesel Fuel Water Trap	Take apart and clean. (Refer to page 1, Section 7.)
Fan Belt	Check tension; replace when necessary. (Refer to pages 2 and 3, Section 4.)
Radiator Fins.	Clean spaces. (Refer to page 2, Section 4.)
Steering Clutch Housing Drain Plugs.	Remove plugs and drain oil accumulation. (Refer to "Lubrication Guide.")
Tracks	Check slack. (Refer to page 1, Section 9.)
Lubrication Points	See "Lubrication Guide."

**AFTER 96 HOURS OF OPERATION (For Ordnance, Navy,
Marine Corps and Air Corps.)**

AFTER 128 HOURS OF OPERATION (For Engineer Corps.)

Lubricating Oil Filters (2).	Replace filter element. (Refer to page 4, Section 6.)
Engine Crankcase	Drain and change oil. (Refer to "Lubrication Guide.")
Diesel Fuel Filter	Clean and wash elements. (Refer to page 2, Section 7.)
Lubrication Points	See "Lubrication Guide."

* - When unusual mud or dust conditions are encountered during operation, it may be necessary to service these points more frequently.

OPERATIONS SECTION

PERIODIC INSPECTIONS - Continued

To insure mechanical efficiency it is necessary that tractors be systematically inspected at intervals as outlined below.

AFTER 240 HOURS OF OPERATION (For Ordnance, Air Corps and Marine Corps.)

AFTER 256 HOURS OF OPERATION (For Engineer Corps and Navy.)

Point of Inspection	Remarks
Gasoline Strainer and Sediment Bowl.	Take apart and clean. (Refer to page 1, Section 7).
Governor Breather on Injection Pump.	Remove and clean. (Refer to page 2, Section 7).
Spark plugs.	Remove and clean; check gap. (Refer to page 1, Section 5).
Magneto Breaker Points and Chamber .	Clean chamber and check gap. (Refer to page 2, Section 5).

AFTER 500 HOURS OF OPERATION (For Ordnance and Marine Corps.)

AFTER 512 HOURS OF OPERATION (For Navy and Engineer Corps.)

Point of Inspection	Remarks
Carburetor Float Valve Strainer. . .	Remove and clean. (Refer to page 3, Section 7).
Cooling System	Clean. (Refer to page 2, Section 4).
Engine Valves.	Check for clearance. (Refer to page 5, Section 6).
Steering Clutch Hand Levers.	Check for free movement at handles. (Refer to page 2, Section 3).
Steering Brake Pedal	Check for free movement at pedal pads. (Refer to page 1, Section 1).
*Air Cleaner, Complete.	Remove and clean. (Refer to page 2, Section 6).
Lubrication Points (500 hours) : : :	See "Lubrication Guide."

* - When unusual mud or dust conditions are encountered during operation it may be necessary to service these points more frequently.

STORING AND HOUSING DIESEL TRACTORS

When the tractor is not to be used for a period of time, it should be stored in a dry and protected place. To leave equipment outdoors, exposed to the elements, will result in materially shortening its life.

Follow the procedure outlined below when the tractor is placed in storage for 30 days or more, and the lubrication precautions should be repeated every six months thereafter. We also recommend caution to be practiced in starting an engine that has been in storage (see instructions on the next page).

(1) Wash or clean and completely lubricate the tractor. (Refer to the "Lubrication Guide.")

(2) Drain the lubricating oil from the Diesel injection pump and governor and refill them with new oil as specified on the Lubrication Guide.

(3) Close the Diesel fuel shut-off valve under the fuel tank, clean the water trap and drain the Diesel fuel filter. Disconnect the fuel supply line at the inlet side of the fuel supply pump, and also disconnect the fuel return pipe at the injection pump. Connect a suitable tubing to the inlet side of the fuel supply pump and lead the free end of the tubing into a container of flushing oil. The oils recommended for flushing are Gulf Oil Corporation No. 301, Shell Latus No. 22 Oil, Formula No. 11326 Standard Oil Company, Capella Oil "AA", or No. 8504 or E382 Socony Vacuum Oil Company. (In emergencies a flushing oil mixture of 1/2 kerosene and 1/2 good grade of light lubricating oil may be used.)

Start the engine and run it on gasoline until sufficient fuel has

been used to assure filling the fuel filters and flushing the pump. (This will require approximately 2 quarts of flushing mixture to fill filter.) (Filling of fuel filter can be determined by opening air bleed on top of fuel filters.)

After the fuel filter has been filled, the engine should continue on gasoline for an additional 5 minutes to assure the flushing of the internal parts of the pump. Then, drain the flushing oil from the fuel filter. Reconnect the regular fuel supply line and reconnect the fuel return pipe to the fuel supply pump.

(4) Drain the water from the cooling system.

(5) Oil the magneto impulse coupling liberally with the proper grade of oil designated in the "Lubrication Guide."

(6) Remove the spark plugs and put the compression release lever in the gasoline (starting) position. Pour one tablespoon full of SAE-50 lubricating oil of a good grade through the spark plug opening into each cylinder. Put the compression release lever in the Diesel position.

(7) Remove the valve housing cover and spray oil over the rocker arm and the starting valve assembly; then, replace the cover.

(8) Cover the exhaust pipe with a tin can to prevent moisture from entering the manifold.

(9) Remove the oil filter element. (If any evidence of rust is found on the center stud, clean the stud thoroughly.) Replace the filter element with new one and drain out any sludge from the filter base.

The engine must not be run after the slushing operation.

**BEFORE STARTING DIESEL ENGINES THAT HAVE
BEEN IN STORAGE**

- (1) Remove the spark plugs and put the compression release lever in the gasoline (starting) position, and pour a mixture of one-half gasoline and one-half engine oil, SAE-10 into each cylinder (two tablespoonfuls per cylinder is enough).
 - (2) Remove the valve housing cover and flush the valve and the valve operating mechanism with same mixture.
 - (3) Crank the engine rapidly until the excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash the old gummy oil from the valves and the pistons.
 - (4) Flush out the impulse coupling with the same grade of oil used for lubrication and lubricate as specified in the "Lubrication Guide."
 - (5) Flush out the crankcase with Diesel fuel; solvent, dry cleaning; or kerosene and fill it with the proper grade of lubricating oil specified in the "Lubrication Guide."
 - (6) Drain the oil from the injection pump and refill the pump to the proper level with the specified grade of lubricating oil shown in the "Lubrication Guide."
 - (7) Be sure the filter has a new element before starting the engine.
 - (8) Remove the tin can from the exhaust pipe.
 - (9) Install the spark plugs.
 - (10) Fill the water cooling system.
 - (11) Fill the fuel tanks.
 - (12) Start the engine and let it run slowly. Observe if any valves are sticking. If so, pour a small quantity of Diesel fuel; solvent, dry cleaning; or kerosene on the valve stem until the valves become loose.
 - (13) Assemble the valve housing cover.
- CAUTION!** Do not accelerate the engine rapidly, or operate it at high speed immediately after starting.

STEERING BRAKES

The steering brakes are 17" external contracting bands on the steering clutch drums.

ADJUSTMENT (See Illusts. 1 and 2).

The adjustment for wear is done by turning the brake rod adjusting knobs "A" on each side (located under the dash just above the engine frame side channels) clockwise until the desired pedal travel is obtained.

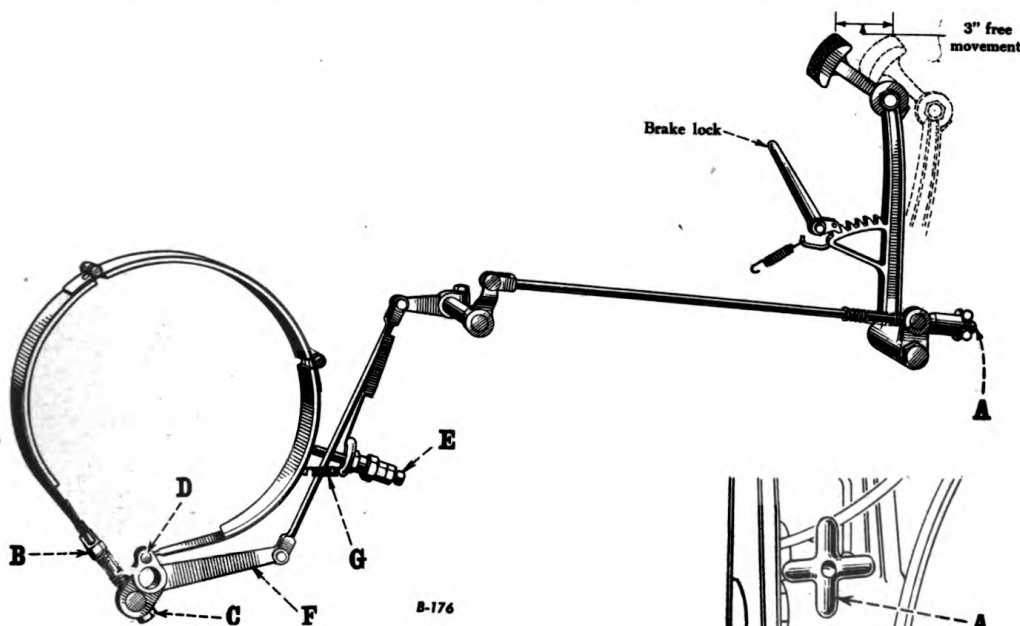
When adjustment can no longer be made with knobs, turn the knobs counterclockwise until about 1 inch of the threads are covered. Then remove the brake inspection cover, under the rear section of the main frame on each side of the tractor. Adjust the brake band set screw "E" to give 1/64 of an inch clearance between the steering clutch drum and the lining at that point and lock the set screw. Loosen the jam nut "B" and turn the steering brake band adjusting bolt "C" until 1/64 of an inch clearance is obtained between the

steering clutch drum and the brake lining at all points. Lock the jam nut "B", replace the covers and adjust the knob "A" to give 3 inches free pedal movement.

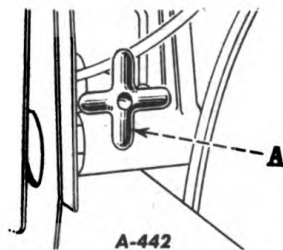
Subsequent intermediate adjustments can be made with the adjustment knobs "A".

BRAKE LINING RENEWAL (See Illusts. 1 and 2).

Release the tension on the adjusting knob "A". Remove the covers from the bottom and the rear of the main frame. Remove the set screw from the brake band pivot shaft and slide the shaft far enough into the main frame so as to remove it from the pivot arm "F". Back up the adjusting set screw "E". Unhook the spring "G" from the brake band. Remove the brake band adjusting bolt "C", pin "D" and pull the brake band from the drum. Reline the bands and replace them by reversing the above procedure; then, adjust as described above.



Illust. 1
Steering Brake Adjustment.



Illust. 2

OPERATIONS SECTION

MEMORANDA

MINOR CHASSIS SERVICE OPERATIONS

STEERING CLUTCH COMPARTMENT AND CLUTCH HOUSING DRAINS

NOTE: If operating the tractor in water, under very wet conditions, or under extremely dusty conditions, water or dust will likely come in through the holes in the drain plugs on the engine clutch and steering clutch compartments. To avoid this, replace these plugs with solid plugs which have no holes.

Remove the plugs after every 64 hours of operation to allow any oil accumulation to drain out.

TRANSMISSION AND SPROCKET DRIVE GEAR CASES

The oil in the transmission case and in the final drive housings should be changed at the interval specified in the *"Lubrication Guide."*

If the oil in the transmission case and in the final drive housings has been thinned with kerosene for operation in temperatures below zero, the oil should be changed before the weather becomes hot.

Remove the drain plugs and drain the oil while it is warm. Allow time for complete drainage, then replace the plugs. Refill to the

proper level with approved Lubricant (see *"Lubrication Guide."*)

TO WASH TRANSMISSION

Fill the transmission case and the sprocket drive gear cases to the proper level with Diesel fuel; solvent, dry cleaning; or kerosene. Operate the tractor in low gear for a few minutes, then remove the drain plugs and allow time for complete drainage. Replace the plugs and fill to the proper levels with fresh lubricant see *"Lubrication Guide."*

REPLACEMENTS OF MAIN FRAME PARTS

When making replacements of parts in the main frame, the old oil should be thoroughly washed out to remove all sediment, etc.; then, refill with new oil. It is important that this be done as foreign matter, such as very fine dirt, etc., will not separate from the old oil by settling.

SETTING BEVEL GEAR DEFLECTION SET SCREWS

Screw in snug (by hand) against highest point of the gear (turn gear to determine this high point) and back off 1/4 of a turn. If feeler gages are used, .020 of an inch is the recommended clearance between the set screw and the high point of the gear.

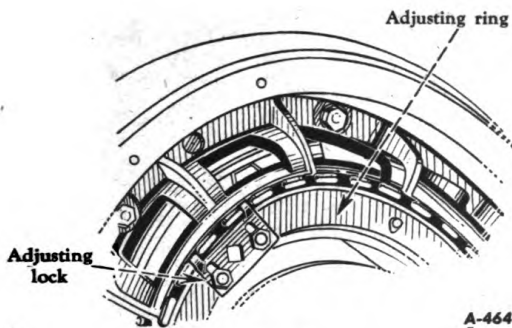
OPERATIONS SECTION

MEMORANDA

OVER-CENTER ENGINE CLUTCH - 15-INCH

CARE OF THE CLUTCH

The over-center clutch is so designed that it requires a minimum of attention. It is important, however, that the instructions for lubricating given on "Lubrication Guide", be followed.



Illust. 1
Adjustment features of the
over-center clutch.

OPERATION AND ADJUSTMENT

(1) The clutch is fully engaged when the engine clutch hand lever is pulled so that full over-center cam engagement is definitely felt.

(2) The clutch needs adjusting only when any noticeable slippage is taking place when the tractor is operating under load.

(3) To adjust the clutch remove the clutch inspection cover on the floor plate ahead of the steering clutch levers.

(4) Loosen the nuts on the adjusting ring lock and disengage the lock from the notches in the back plate.

(5) With clutch hand lever in the disengaged position, turn the adjusting ring in a clockwise direction, moving it one notch, or possibly two notches at the most at any one time. Engage the ring lock in the back plate. Pull the hand lever back as a check to determine if over-center engagement can be felt.

For satisfactory operation of the clutch do not have the clutch adjusted so tight that this full over-center engagement is not easily secured.

If little or no pressure is required on the end of the hand lever to engage the clutch, then further adjustment, as outlined above, is necessary.

(6) When correct clutch adjustment is obtained, be sure to tighten the nuts on the adjusting ring lock and replace the cover plate.

The correct adjustment has been made when a considerable (not excessive) pressure is felt when pulling clutch hand operating lever to engaged position so that a definite over-center cam engagement is felt.

If the adjustment has been made as described above, and the cams are so tight that you do not get the full over-center engagement, the adjusting ring should be backed off one notch (in counterclockwise direction).

STEERING CLUTCHES

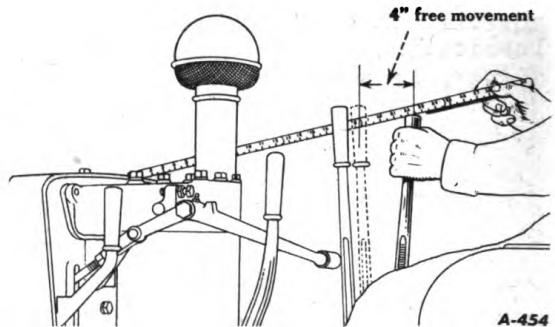
If the steering clutch slips, or if the steering clutch hand lever free movement is less than 2 inches (measured at the handle of the lever), adjustment is necessary.

TO ADJUST (See Illusts. 2 and 3.)

Loosen the yoke lock nuts "D" and the rod by turning nut "H" so as to lengthen the rod. Then tighten the lock nuts "D" against the rods.

Check to see if the free movement of hand lever is 4 inches.

When adjustment can no longer be made by means of lengthening the operating rod, remove the release

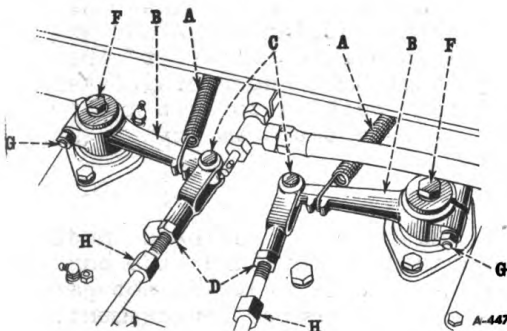


Illust. 3
Adjustment of Steering
Clutch Levers.

lever return spring "A" and the operating rod yoke pin "C"; then remove the steering clutch release lever cap screw "F". Loosen the cap screws "G" and pry the release lever off the splined release shaft and turn the right hand release lever clockwise (left hand release lever counterclockwise) slightly, and replace the lever on the splined release shaft. Then loosen the lock nut and adjust the operating rod until a free movement of 4 inches is obtained.

When the desired free movement of the hand lever is obtained, replace and tighten the release lever cap screw "F" and tighten the cap screws "G".

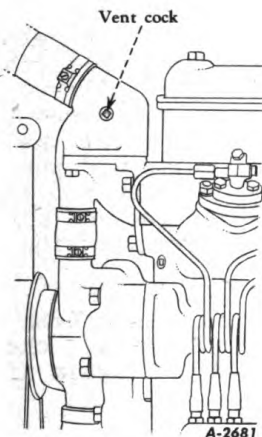
Subsequent intermediate adjustments can be made by means of lengthening rod linkage as described above.



Illust. 2
Steering Clutch Adjustment.

COOLING SYSTEM

The water is circulated through the engine block, cylinder head and radiator by a centrifugal pump. The water temperature is controlled by a thermostat that does not allow the water to flow through the radiator until the engine has reached operating temperature. With the thermostat closed the water circulates only through the engine.

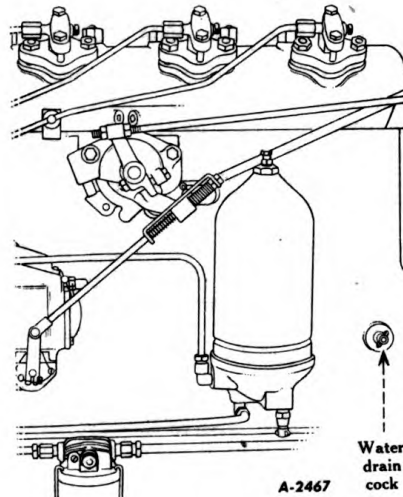


Illustr. 1
Showing Thermostat Housing
Vent Cock

TO FILL COOLING SYSTEM

The water capacity of this tractor is approximately 20 gallons (U.S.).

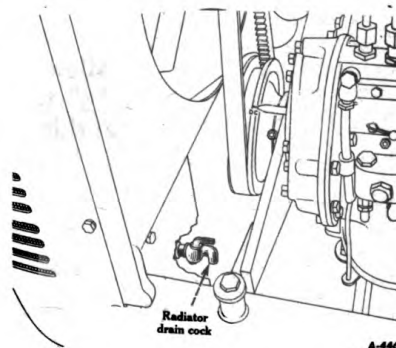
- (1) Close the crankcase and radiator drain cocks (see Illustrs. 2 and 3).
- (2) Remove the vent plug in the thermostat housing (see Illustr. 1).
- (3) Pour water (soft or rain water, if available) into the radiator until water flows from thermostat housing. Replace vent plug and fill the radiator to level 1" below bottom of filler neck.



Illustr. 2
Showing Crankcase Drain Cock

(4) Do not pour cold water into the radiator if the engine is very hot, unless conditions make it absolutely necessary. Under such conditions, start the engine and let it idle. Then slowly pour the water into the radiator.

(5) If the engine is to be operated in freezing temperatures, refer to "COLD WEATHER OPERATION" on page 12. Section G.



Illustr. 3
Showing Radiator Drain Cock

COOLING SYSTEM - Continued

TO CLEAN OUT DIRT AND SLUDGE

(1) Drain the cooling system by opening the radiator drain cock and the crankcase drain cock. Allow the system to drain and close the drain cocks. (See *Illusts. 2 and 3.*)

(2) Fill the cooling system with a solution of 6 to 7 pounds of ordinary washing soda mixed with 20 gallons (U.S.) of water (cooling system capacity).

(3) Leave the radiator filler cap off and run the engine until the water is hot, then drain and flush with clean water.

RADIATOR CORE

Overheating is often caused by bent or clogged radiator fins. If the spaces between the radiator fins become clogged, clean them with an air or a water hose. When straightening bent fins be careful not to injure the tubes or break the bond between fins and tubes.

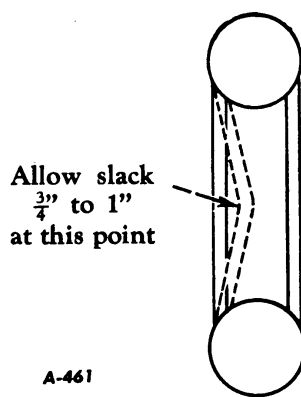
FAN BELT TENSION

The slack of the fan belt should be checked frequently to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by the thumb, approximately $\frac{3}{4}$ to 1 inch midway between the two pulleys as shown in *Illust. 4*. If the slack is more than 1 inch, adjust the belt as follows:

ADJUSTING THE BELT

The tension of the fan belt is adjusted by changing the width of the groove in the fan pulley. To adjust, loosen the set screw (2) (*Illust. 5*), then screw the pulley flange (1) in toward the belt to tighten the belt, and out to loosen it. Retighten the set screw (2) after the correct tension is obtained.

After a new belt has been run approximately 50 hours, check the tension and adjust again if necessary.



Illustr. 4
Correct Belt Tension

COOLING SYSTEM - Continued

The belt should at no time contact the bottom of the pulley groove because this will wear it out rapidly. Adjust the pulley for a narrower groove, if this is possible without increasing the tension more than allowable. Having "V" belts tighter than the tension specified will result in rapid wear.

REMOVING THE FAN BELT (See Illust. 5.)

To remove the fan belt, loosen the screw (2) in flange on the fan pulley and unscrew the flange as far as possible. Start the belt over the outer flange of the lower pulley and pry it out with a light bar or rod. Slowly crank the engine at the same time and the belt will work off the pulley. After the belt is off the pulley, remove the starting crank. The belt can now be worked over the top of the fan blades.

REPLACING FAN BELT

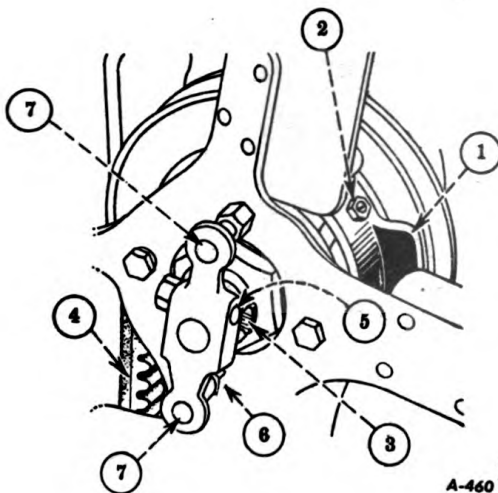
The fan belt should be replaced when it becomes soaked with grease, or when it is so badly worn that it does not drive the fan at the proper speed.

When replacing the belt, reverse the procedure outlined under "Removing Fan Belt", except the belt can be started on the lower pulley by hand, and by slowly cranking the engine the belt will find the correct position.

WATER PUMP PACKING

Due to wear after considerable service, the pump packing may leak. If this occurs, tighten the packing nut (3) (see Illust. 5) just enough to stop the leaking.

To install new packing, remove the driver pin (5) and the driver (6). Unscrew and remove the packing nut (3). Place the water pump packing around shaft and reassemble the packing nut, driver and the driver pin.



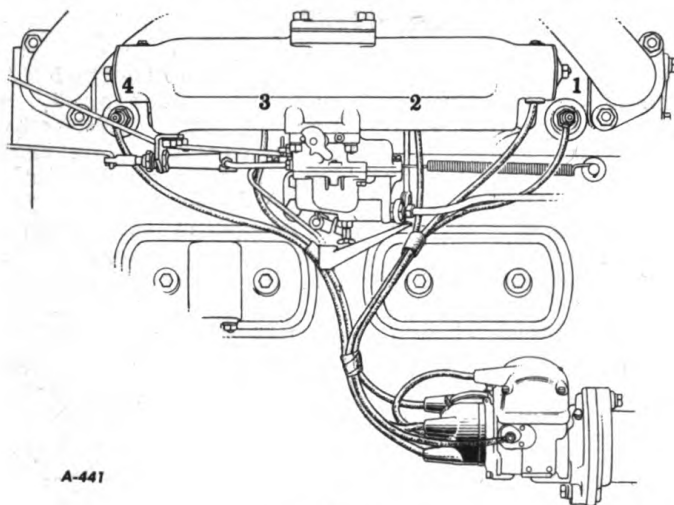
- (1) Fan pulley flange.
- (2) Set screw in pulley flange.
- (3) Water pump packing nut.
- (4) Fan belt.
- (5) Driver pin.
- (6) Driver.
- (7) Stud.

Illust. 5

OPERATIONS SECTION

MEMORANDA

SPARK PLUGS AND CABLES

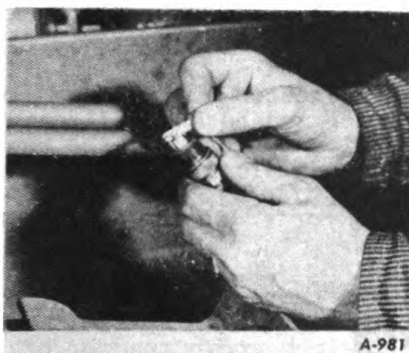


Illustr. 1

H-4 Magneto--Wiring Chart. Engine firing order is 1, 3, 4, 2.

SPARK PLUGS

The spark plug selected after careful tests as suited for this engine is the Champion No. 44 and should be used ordinarily. At the interval specified under "Periodical Inspections", page 14, Section G, or oftener if necessary, remove the spark plugs for cleaning and checking gaps between electrodes.



Illustr. 2

Checking the Gap between the Points. Gap should be .035 to .040-in.

A gap of .035 to .040-inch should be maintained (a gage of this thickness is furnished). When making this adjustment, always bend the outer electrode. Never bend the center electrode as it may

damage the insulator. If the gap between the electrodes is too great, due to improper setting or burning off the ends, the engine will misfire and be hard to start.

CLEANING SPARK PLUGS

Sand blasting is the recommended method of cleaning spark plugs.

Never scrape or clean the insulator with anything which will scratch the porcelain. Scratched porcelain allows carbon and dirt to accumulate much faster.

SPARK PLUG CABLES

If spark plug cables are removed for any reason, note the position of each cable on magneto so they can be replaced correctly. (Wiring Chart, Illustr. 1, shows correct wiring.)

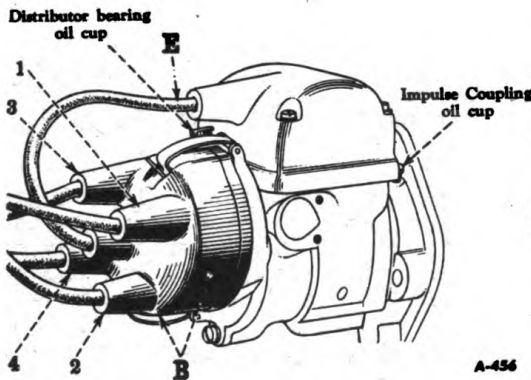
There should be 1/4-inch minimum clearance between the spark plug cables and the cylinder head. By maintaining this clearance, shorting-out the spark plug will be prevented and the cable will be away from the extreme heat of the cylinder head. If the cable touches the head, heat soon causes the rubber to become soft and ruins the cable.

MAGNETO

This tractor is equipped with a high-tension magneto which is designed and built in accordance with the latest ignition practices.

LUBRICATION

Every 64 hours of operation, oil the impulse coupling liberally with the grade of oil specified in the "Lubrication Guide".



Illust. 3
Counterclockwise Rotation
(viewed from the distributor end)

Fill the distributor bearing oil cup with lubricant at the interval specified in the "Lubrication Guide". Do not oil oftener as excessive oil might work into the breaker point chamber and cause rapid point wear.

GREASING BREAKER MECHANISM AND CHECKING POINTS

This magneto requires very little attention other than properly lubricating the oil cups as specified above.

It is important, however, to keep the breaker arm chamber clean, as oil on the breaker points will cause rapid point wear. Overlubrication of the distributor bearing oil cup (see Illust. 3) might cause a dirty breaker point chamber. At the interval specified

under "Periodical Inspections", page 14, Section G, inspect the breaker point chamber to assure that it is clean. See that the points are in good condition and have the proper clearance. If the chamber is clean, no attention is necessary other than checking the clearance of the points; but if the chamber is dirty, all parts must be thoroughly cleaned. After cleaning, the points should be dressed, the point clearance checked, and the breaker arm regreased as outlined below.

To reach the breaker mechanism, remove the distributor cap and crank the engine slowly until metal strip on distributor rotor points toward the No. 1 terminal on distributor cap and impulse coupling just trips. Remove the distributor rotor. Take off the distributor body by removing the three screws (see "A", Illust. 4). Do not crank the engine while the distributor body is removed or it might be necessary to retune the magneto to the engine.

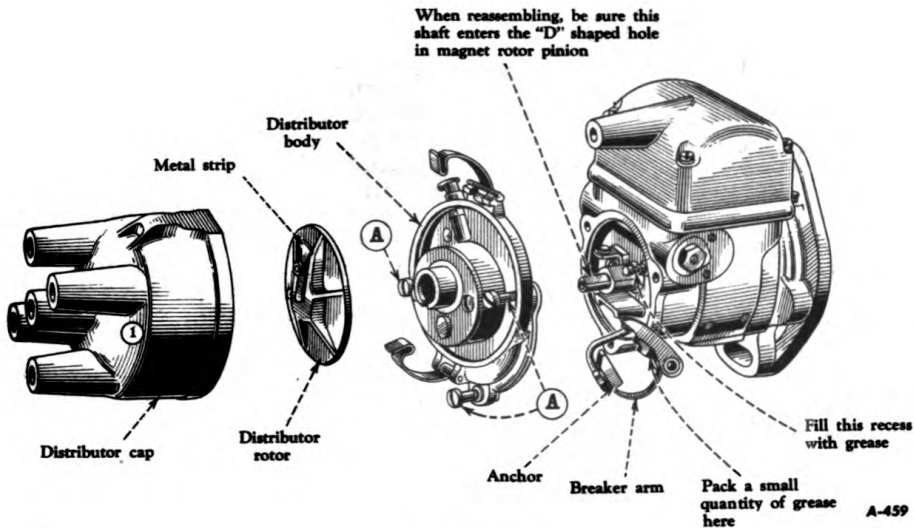
Pry the breaker arm and anchor from the chamber and clean all parts. Inspect the breaker points and if necessary, dress them with a sharp fine file. If the points are worn excessively, replace both points.

Fill the recess in breaker post with lubricant and pack a small quantity of lubricant in back of the breaker arm rubbing block (see Illusts. 4 and 5). (Refer to "Lubrication Guide" for grade of lubricant to be used.)

Assemble the breaker arm, leaving the spring anchor projecting 1/8 to 3/16-inch above the top of slot so it is pushed into place by distributor body. Be sure the points line up after breaker arm is pushed into place.

Check the gap between the breaker points using the gage furnished with the tractor (see Illust. 5). The point opening should be .013-inch when the rubbing block is on the high part of the cam. If gap

MAGNETO - Continued



Illustr. 4

is not correct, adjust it by loosening the screw holding the adjustable point (see Illustr. 5) and moving the point up or down until gage slips snugly into opening. After the proper adjustment has been made, tighten the screw.

Line up the distributor rotor key with keyway in spindle (see Illustr. 4) and press rotor loosely on spindle. With the engine on top dead center of the No. 1 firing stroke, turn the distributor rotor until the metal strip on rotor points to the No. 1 terminal on the distributor cap. Place the distributor body on the magneto and be sure rotor shaft enters the "D" shaped hole in magnet rotor pinion. Remove the distributor rotor to tighten the three screws (see "A", Illustr. 4). Replace the distributor rotor and distributor cap.

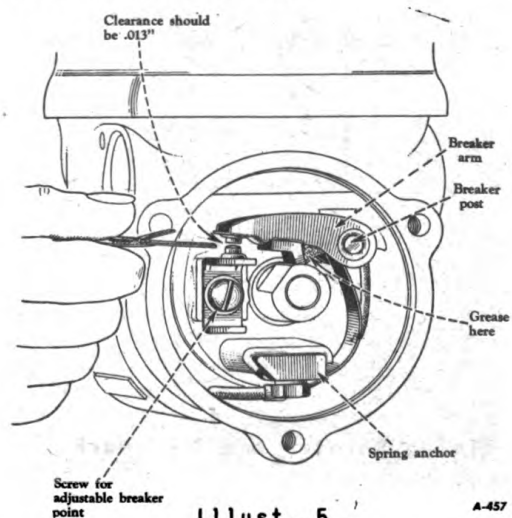
GREASING ROTOR BEARINGS AND DISTRIBUTOR GEAR CASE

Every 2,000 hours of operation, or at least every two years, the magnet rotor bearings, distributor gear case, and distributor gear bearing should be cleaned and re-packed. This is to be done by the

proper maintenance personnel.

DISTRIBUTOR CAP

Both the inside and outside of distributor cap should be kept reasonably free of dust and oil deposits. To assure long life of the distributor, care must be taken to keep the two small ventilator holes (see "B", Illustr. 3) open at all times. The distributor rotor should also be kept clean.



Illustr. 5

MAGNETO - Continued

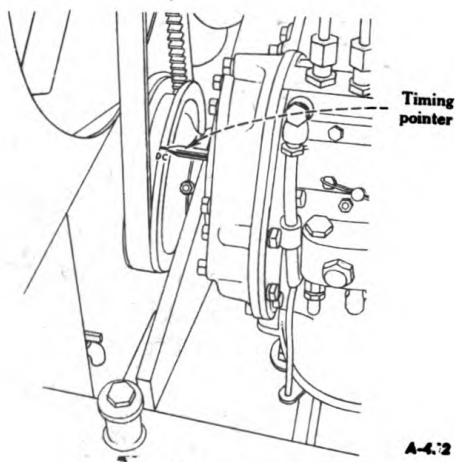
INSTALLING AND TIMING THE MAGNETO TO ENGINE

If the magneto has been removed, the following instructions must be closely followed when replacing the magneto on the engine:

(1) Pull out cable "E" (see *Illust. 3*) from the coil cover end. This will eliminate any possibility of accidental starting.

(2) Set the compression release lever in low compression position (gasoline operation).

(3) Crank the engine until the No. 1 piston (the piston next to the radiator) is on the upper dead center of the compression stroke. The compression stroke can be determined by removing the No. 1 spark plug. Place your thumb over the opening and crank the engine until an outward pressure is felt. Continue cranking slowly until the notch marked "DC" on the fan drive pulley is in line with the pointer on the front crankcase cover. (See *Illust. 6*.)



Illust. 6
Timing Pointer and "DC" Mark.

(4) Remove the distributor cap and turn the magneto coupling in a clockwise direction (as viewed from the coupling end) until the metal strip on the distributor rotor points toward the No. 1 terminal on the distributor cap.

(5) Assemble the magneto on the engine. Make sure the lugs on the impulse coupling engage in the slots on the magneto drive coupling. (Assemble the magneto so the top is as far away from the crankcase as possible.)

(6) Insert the magneto mounting bolts loosely in the magneto flange, just enough to hold the magneto in place. Then, crank the engine one complete revolution to the next top dead center. Now, push the upper part of the magneto toward the engine until the impulse coupling just trips.

(7) Tighten the mounting bolts securely. Attach the spark plug cables to the engine and magneto. Start by connecting the No. 1 cylinder spark plug to the socket marked "1" on the distributor block, connect the No. 3 socket with the No. 3 cylinder, next with the No. 4 cylinder, next with the No. 2 cylinder (see *Wiring Charts, Illusts. 1 and 3*).

(8) To check the timing, crank the engine slowly until the top dead center of the No. 1 cylinder is reached at which time the impulse coupling should just trip.

(9) The magneto is now correctly wired and timed.

NOTE: Push the cable "E" back into the socket in the coil cover (see *Illust. 3*).

ELECTRICAL EQUIPMENT

WIRING DIAGRAM

The wiring diagram, located in the *Electrical Section of the Spare Parts Catalog* may be used as a guide in identifying the various electrical units, and for tracing the electrical cables and connections.

PRECAUTIONS

CAUTION! As a precaution against shorting and causing damage to any of the electrical units, disconnect the battery ground cable, at the battery end, before working on any part of the electrical system. Do not reconnect this cable until all the electrical work has been completed.

Be sure all the terminals are clean and securely fastened. Make sure there are no broken wires anywhere in the electrical circuit.

Tractors are shipped with the battery ground cable disconnected at the battery end, and in addition, the connection at the "F" terminal on the generator frame is not completed. Before operating the tractor, connect the "battery to ground" cable, and connect the generator wires.

DANGER! The generator will burn out if operated with the battery cables, or the battery charging circuit cables disconnected or broken. To operate the generator without the battery, remove the connection from the "GEN" terminal on the relay and ground it on the relay mounting screw, or remove the generator field cable from the "F" terminal on generator frame.

STORAGE BATTERIES

To prevent failure of batteries it is important that the electrolyte in the batteries be kept at the proper level at all times.

Keep the vent hole in the battery filler caps open.

Batteries when shipped dry should be serviced as outlined on the instruction tag attached to the battery.

Inspect the battery every 64 hours or oftener to keep the water at the correct level and to maintain the correct specific gravity. The specific gravity reading of about 1.250, corrected to 80° F. should be maintained. (See Chart "VARIATION OF SPECIFIC GRAVITY WITH TEMPERATURE" on page 8.)

CAUTION: If water is added to the battery when the temperature is near the freezing point (32° F.) always run the engine long enough to mix the water and the electrolyte so the water in the battery does not freeze.

Acid or electrolyte should never be added except by a skilled battery man. Under no circumstances add any special battery "dopes", solutions or powders.

The electrolyte in each cell should be 3/8 of an inch above the separators. When the electrolyte is below this level, pure distilled water should be added. Never use hydrant water, or any water which has been in a metal receptacle. Keep on hand a glass jar of pure distilled water for battery use only. Use a clean syringe to put water in a cell.

The battery cable terminals must be clean and tight. Use hot water to remove any terminal corrosion, and also for cleaning the top of the battery. Brighten the terminal contact surfaces with wire wool, apply a light coat of vaseline and reassemble. Be sure the terminals are clamped tightly and be sure the battery is clamped securely in the battery box; if this is done two or three times a year you should have no trouble from corroded terminals.

ELECTRICAL EQUIPMENT - Continued

GENERATOR AND LIGHT SWITCH

The generator has an adjustable third brush for changing the charging rate. It also has a light switch with a field resistance control for regulating the charging rate of the generator from the instrument panel.

The generator field circuit is grounded through the light switch. Therefore, it is necessary at all times to make sure that a good electrical connection is made between the switch and the mounting panel.

The light switch is used to control the generator field resistance and has four positions; Low Charge, High Charge, Dim and Bright.

When the lights are turned on either dim or bright, the field circuit is direct to the ground giving high charge or increased generator output. This is also true when the switch is on the high charge position.

During the daytime when lights are not used, the switch should be put in the low charge position. This adds a resistance coil to the field circuit and reduces the output of the generator to approximately one-half its original charge rate. If the charge in the battery is low, the switch should be placed in the high charge position until the battery has a full charge as indicated on *Specific Gravity Chart on page 8*.

The generator as received from the factory, has the third brush set in a position to give an output of approximately 9 amperes when the switch is in the high charge position, and

4 to 5 amperes when the switch is in the low charge position. It may be desired to reduce the charging rates mentioned. This can be done by adjusting the third brush. (See paragraph relating to third brush adjustment on page 7.) The charging rates given are for average conditions only. The generator output may have to be varied to meet abnormal operating conditions in order to maintain a fully charged battery. To obtain the best life and performance of the battery, maintain the correct specific gravity. Do not under or over-charge it.

GENERATOR AND STARTING MOTOR COMMUTATORS

If the commutator is dirty or slightly burred, it can be polished with a strip of No. 00 sandpaper. *Never use emery cloth.*

TO CLEAN COMMUTATORS

The commutator can be cleaned by placing a strip of sandpaper between the brush and the commutator, while the armature is revolving. After the polishing operation, all dust must be blown from the commutator. If the commutator is very rough or out of round, it should be referred to the proper maintenance personnel.

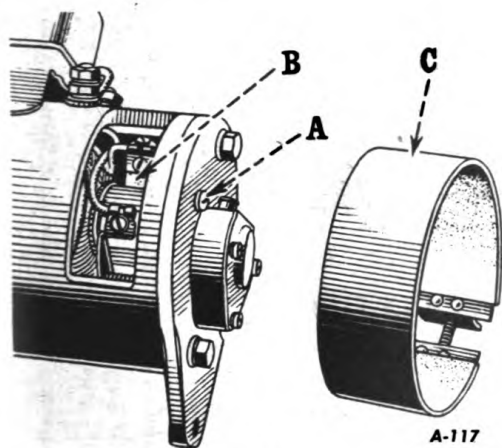
GENERATOR LUBRICATION (2 CUPS)

Every 64 hours of operation, put 8 to 10 drops of engine oil into the oil cups. Do not lubricate excessively as excessive oiling may cause oil and grease to gum on the commutator and cause a reduction of the generator output. *Never oil the commutator.*

ELECTRICAL EQUIPMENT - Continued

TO ADJUST CHARGING RATE BY THIRD BRUSH - See Illusts. 7 and 8.

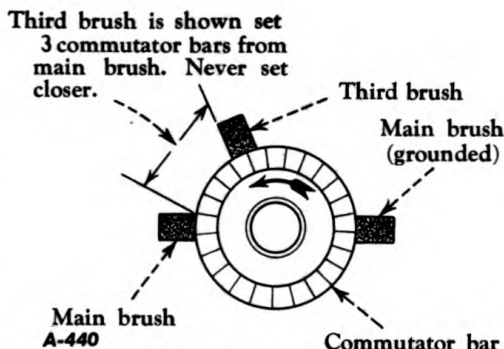
Remove the cover band "C" and loosen the round head screw "A" on the commutator end bearing casting until the lock washer tension is released. Do not try to remove the screw. Change the charging rate by moving the third brush "B". This brush is the one mounted on a movable carrier, whereas the other main brushes are mounted directly on the end bearing casting. The rate of charge is increased by moving the third brush in the direction of rotation of the armature. To decrease the rate of charge, move the third brush in a direction opposite to that of the armature rotation.



Illust. 7
Generator showing Third Brush

The maximum rate of charge for the generator (with the switch in the high charge position and with no electrical load) is 6 to 8 amperes when "hot" and 8 to 10 amperes when "cold". **DO NOT SET BEYOND THESE LIMITS.** Always check the maximum generator output when operating with a fully charged battery.

IMPORTANT! The third brush should never be set closer than 3 commutator bars from main brush (see Illust. 8).



Illust. 8
View showing Commutator End (Brush Setting)

When the above adjustments are completed, be sure to tighten the round head screw "A" which locks the third brush carrier in place. Reassemble the cover band "C" with the joint on the bottom of the generator so that the joint is not over any opening.

CAUTION! The above adjustment should be done by proper maintenance personnel.

GENERATOR BELT TENSION

The slack of the generator belt should be checked frequently to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by the thumb, approximately $\frac{3}{4}$ " to 1" midway between the two pulleys. If the slack is more than 1", adjust the belt for proper tension.

Variation of Specific Gravity with Temperature

Consult This Chart

Read the thermometer in the battery acid—read the Hydrometer—then at the top of the table find the column headed by the temperature which is nearest the battery acid temperature; find, in that column, the figure nearest the observed Specific Gravity reading, and trace horizontally across to the 80° F. column. The 80° F. figures are the true acid gravity and should form the basis for any acid adjustment.

The specific gravity of acid in fully charged batteries should not exceed the value specified by the manufacturer (base temperature 80° F.). If hydrometer readings are taken at acid temperatures other than 80° F., allowance must be made for temperature.

All figures in horizontal lines represent the same state of charge but at the various temperatures shown in the column headings; that is, 1.280 Specific Gravity at 80° F. (the base temperature) becomes 1.268 when Electrolyte temperature is 110° F., and 1.312 when Electrolyte temperature is 0° F.

0° F.	10° F.	20° F.	30° F.	40° F.	50° F.	60° F.	70° F.	80° F.	90° F.	100° F.	110° F.	120° F.
1.167	1.163	1.160	1.157	1.154	1.150	1.147	1.144	1.140	1.137	1.134	1.131	1.127
1.177	1.174	1.170	1.167	1.164	1.160	1.157	1.154	1.150	1.147	1.143	1.140	1.137
1.187	1.184	1.181	1.177	1.174	1.170	1.167	1.164	1.160	1.157	1.153	1.150	1.146
1.198	1.195	1.191	1.187	1.184	1.180	1.177	1.173	1.170	1.166	1.163	1.159	1.156
1.208	1.205	1.201	1.198	1.194	1.191	1.187	1.183	1.180	1.176	1.173	1.169	1.165
1.219	1.215	1.211	1.208	1.204	1.201	1.197	1.193	1.190	1.186	1.182	1.179	1.175
1.229	1.225	1.222	1.218	1.214	1.211	1.207	1.203	1.200	1.196	1.192	1.189	1.185
1.239	1.236	1.232	1.228	1.224	1.221	1.217	1.213	1.210	1.206	1.202	1.198	1.195
1.251	1.247	1.243	1.239	1.236	1.232	1.228	1.224	1.220	1.217	1.213	1.209	1.205
1.261	1.257	1.253	1.249	1.246	1.242	1.238	1.234	1.230	1.227	1.223	1.219	1.215
1.271	1.267	1.263	1.259	1.256	1.252	1.248	1.244	1.240	1.236	1.233	1.229	1.225
1.281	1.277	1.273	1.269	1.266	1.262	1.258	1.254	1.250	1.246	1.243	1.239	1.235
1.291	1.287	1.284	1.280	1.276	1.272	1.268	1.264	1.260	1.256	1.252	1.248	1.245
1.301	1.298	1.294	1.290	1.286	1.282	1.278	1.274	1.270	1.266	1.262	1.258	1.255
1.312	1.308	1.304	1.300	1.296	1.292	1.288	1.284	1.280	1.276	1.272	1.268	1.265
1.322	1.318	1.314	1.310	1.306	1.302	1.298	1.294	1.290	1.286	1.282	1.278	1.274
1.332	1.328	1.324	1.320	1.316	1.312	1.308	1.304	1.300	1.296	1.292	1.288	1.284
1.342	1.338	1.334	1.330	1.326	1.322	1.318	1.314	1.310	1.306	1.302	1.298	1.294
1.354	1.350	1.346	1.342	1.337	1.333	1.329	1.325	1.320	1.316	1.312	1.308	1.303

With battery fully charged and on charge at the normal rate, the cell voltage will be about as follows:

Average cell voltage at 80° usually falls between 2.5 and 2.7 volts.

Average cell voltage at 100° usually falls between 2.4 and 2.6 volts.

For accuracy always take acid temperature when reading specific gravity.

ENGINE SERVICE OPERATIONS

CYLINDER HEAD GASKET

For the most satisfactory results in tightening the cylinder head after installing the cylinder head gasket, tighten all nuts fairly snug, starting with the row on the center line, then going to the others. Retighten in the same order, giving each nut a small part of a turn at a time. Continue this until all the nuts are tight. Do not screw one nut down perfectly tight and then go to the next, as you will not secure an even pressure on the gasket in this manner.

After replacing the cylinder head, it is necessary to assure against leaks by retightening the stud nuts after the engine has been run and the water jacket becomes thoroughly heated. To tighten the nuts properly, the valve rocker shaft assembly must be raised.

Be sure to adjust the valve tappet clearance after the last tightening of the cylinder head stud nuts (see "Valve Adjustment" on page 5).

REMOVING CYLINDER HEAD OR VALVES

Whenever the cylinder head or the valve mechanism has been removed, care must be taken when they are replaced that valves are not damaged by coming into contact with the top of the piston, or through improper adjustment of the valve lever screw by being pushed down too far into the cylinder sleeve. To prevent this, always loosen the valve lever screw clear up and bring the piston to the top dead center of the compression stroke. Then screw down on the adjustment screw until the proper clearance is obtained.

After replacing the cylinder head, check to see that there is a clearance of not less than .060-inch or more than .080-inch, between all four starting valve covers and starting valve shaft cam rollers, in Diesel position. If the clearance is incorrect, readjust the operating rod adjusting yoke on the right side of the engine.

REMOVAL OF PISTONS

If the pistons are to be removed from the crankcase, care must be taken to see that each part is reassembled in its original place and position. To assist in this operation, pistons, connecting rods and connecting rod caps are marked with the corresponding cylinder numbers 1, 2, 3 and 4, and the cylinder numbers are also marked on the bottom flange of the crankcase.

Each piece should be reassembled so that the numbers correspond. Also, all the numbers should be on the same side of the assembly as the number on the crankcase flange indicates.

IRREGULAR FIRING OF ENGINE

The bleeder valves at the top of the injection nozzles at the cylinder head should be opened only in case of irregular firing caused by entrapped air in the injection lines, or if the engine is continuously noisy in one cylinder. Opening the bleeder valve will locate the noisy cylinder and usually indicate a faulty injector.

(See Instructions on page 4, Section 7, for venting fuel system.)

AIR CLEANING SYSTEM

OIL CUP

Clean and refill the oil cup every day, or every 8 hours of operation (more frequently when operating under dusty conditions). Refill the oil cup to the oil level bead with the grade of oil *specified in the "Lubrication Guide"*. The oil cup capacity is 5-1/2 pints (U.S.).

Before replacing the oil cup, clean or wipe the oil or grit from the top bead of the oil cup.

AIR INTAKE CAP AND TOP CASTING

The screen in the air intake cap prevents chaff and other coarse dirt from getting into the air cleaner. This screen should be kept clean and free from all chaff, oil, dust, or paint because clogged holes in the screen will reduce the power of the engine by restricting the flow of the air.

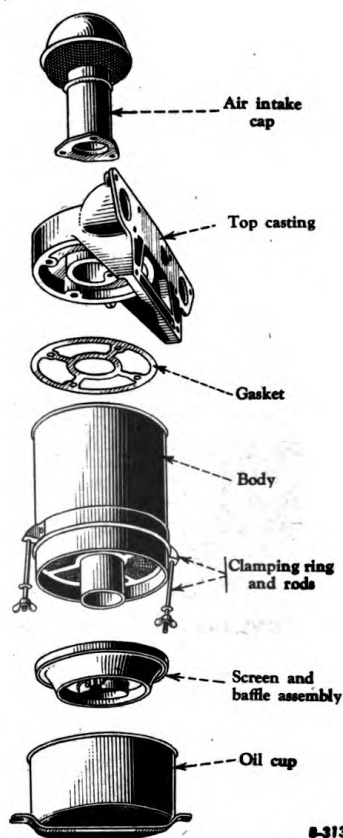
WASHING THE CLEANER

After every 64 hours of operation, particularly if operating the tractor in an atmosphere heavily laden with dust, chaff or lint, remove the entire air cleaner from the tractor and completely disassemble it. Wash the parts thoroughly in Diesel fuel; solvent, dry cleaning; or kerosene. Be sure to clean out the air intake pipe, also thoroughly clean out the inside of the top casting.

After all the parts have been thoroughly cleaned, replace the air cleaner body on the tractor. Make sure all the joints are airtight, then replace the air intake cap. Fill the oil cup to the proper level with the specified grade of oil and replace it on the air cleaner. Be sure it is held securely in place by the cup clamps.

GENERAL PRECAUTIONS

As an added precaution against dirt getting into the engine, frequently inspect the flexible rubber hose connections between the carburetor and the air cleaner. If they show any sign of deterioration, replace them.



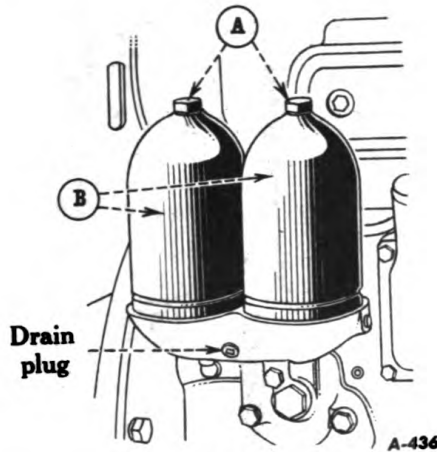
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Illust. 1
"Exploded" View of the Air Cleaner
Removed from the Tractor.

To eliminate strain on the rubber hose connections be sure the pipes line up.

All joints between the air cleaner and carburetor, manifold and the cylinders of the engine should be tight. All the gaskets must be in a good condition and the bolts should be drawn up tight.

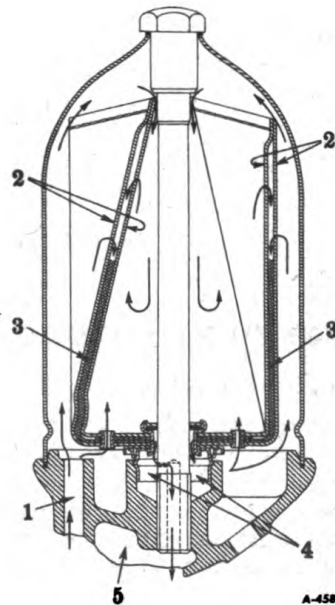
LUBRICATING OIL FILTERS



Illust. 2
Showing Dual Oil Filters Assembled.

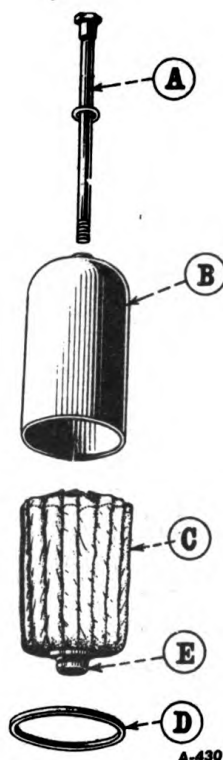
The life of the engine depends upon clean oil being circulated to all bearings. Every good tractor operator knows that minute particles of abrasive matter eventually accumulate in the crankcase of the engine, and that in the normal course of engine operation, the lubricating oil undergoes changes which produce sludge, acids, gums varnish, and other harmful by-products.

The purpose of the oil filters is to separate and remove the dirt and other foreign substances from the oil to prevent these injurious materials from being circulated to the engine. The oil filter elements should be replaced each time the engine oil in the crankcase is changed. (Refer to the "Lubrication Guide".) Close adherence to the simple, common-sense procedure for keeping dirt and oil impurities away from precision-made engine parts will safe-guard the tractor engine against undue wear and the operating troubles and upkeep expense which are a natural result of that condition.



Illust. 3
Cutaway view of filter showing; (1) oil inlet; (2) replaceable filtering element; (3) mesh screen separator to provide passage for filtered oil between inner and outer layer of element; (4) outlet for filtered oil; (5) filtered oil return.

LUBRICATING OIL FILTERS - Continued



Illustr. 4
Detail of Oil Filter Disassembled.

TO CHANGE FILTER ELEMENTS

- (1) Stop the engine.
- (2) Remove the oil filter base drain and allow the oil filters to drain completely.
- (3) Clean off the filter cases to eliminate any possibility of dirt dropping into the base.
- (4) Unscrew and remove the retaining bars "A".
- (5) Lift up and remove the cases "B".
- (6) Remove the old elements "C".

NOTE: If some special equipment on the tractor prevents the lifting of the case "B" over the element "C", remove the case and the element as a unit.

(7) Wipe out the base and the cases with a cloth dampened with kerosene.

(8) See that the case gaskets "D" are in position. Replace the drain plug in the filter base and install the new filter elements (pilot "E" must be down). Replace the cases and retaining bars "A" and draw the nuts up tight.

(9) Check the oil level in the crankcase to see that the new oil is up to the proper level (see "Lubrication Guide"). Now start up the engine, see that oil pressure indicator is registering pressure and inspect the filter for oil leaks.

VALVE CLEARANCE ADJUSTMENT

Check the valves for clearance every 500 to 512 hours and adjust the clearance if necessary. A clearance of .018-inch is necessary between end of the valve levers and the valve stems when the valves are closed, when engine is hot.

(1) Before checking the valve clearance, cut out the magneto by pulling the cable "E" (see *Illust. 3, Section 5*) out of the socket. This will eliminate any danger of accidentally starting the engine.

(2) Set the compression release lever in low compression position (gasoline operation).

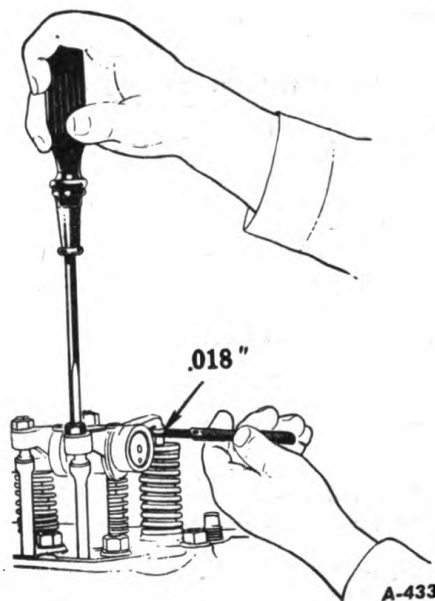
(3) Remove the valve housing.

(4) Remove the spark plug from the No. 1 cylinder (the cylinder next to the radiator).

(5) Place your thumb over the spark plug opening and slowly crank the engine until an outward pressure can be felt. Pressure indicates No. 1 piston is moving toward upper dead center of the compression stroke.

(6) Continue cranking slowly until the notch marked "D.C." on fan drive pulley is in line with timing pointer in the front crankcase cover. (See *Illust. 6, Section 5*.) Both the valves are now closed on compression stroke of the No. 1 cylinder.

(7) Loosen the lock nut and adjust the screw in the valve lever so that the gage slips snugly between the end of the valve lever and the valve stem (see *Illust. 5*). Tighten the lock nut and recheck clearance.



Illust. 5
Gaging Valve Levers
with a Feeler Gage.

(8) Crank the engine 1/2 of a revolution at a time and check the clearance of each cylinder's valves and adjust the clearance if necessary. Do this on each set of cylinder valves in succession according to the firing order of the engine, which is 1, 3, 4, 2.

(9) Replace the valve housing. Check to see that the valve housing gasket makes an oil tight seal with the cylinder head. Replace the gasket with a new one if necessary.

(10) Replace the magneto cable "E" into the socket from which it was removed.

IMPORTANT! Be accurate - use a feeler gage for checking the valve clearance.

SUGGESTIONS FOR CHECKING TROUBLE

Study the problem before making any changes.

If any adjustments are to be disturbed, the original setting should be noted, so this same setting may be restored in case the part changed does not remedy the trouble.

FAILURE TO START ON GASOLINE:

No gasoline in carburetor.
Gasoline supply cock closed.
Carburetor choked too much.
No spark from magneto.
Gears engaged (transmission).
Gasoline starting device not set.
Condensation on spark plugs.

MISSING AND BACKFIRING:

Water in gasoline.
Air leaks around intake manifold.
Starting valves not properly seated.

FAILURE TO CHANGE OVER TO HIGH COMPRESSION OPERATION:

Starting valve mechanism sticks.
Injection pump not primed (vent air).
Fuel supply cock closed at tank.
Speed control hand lever not set in proper position.
Fuel supply pump not developing fuel pressure.

LACK OF LUBRICATING OIL PRESSURE:

Insufficient amount of oil.
Dirt under pressure regulating valve.
Oil pump strainer clogged or pump not working.
Broken oil pressure indicator or pipe lines.

LACK OF POWER:

Injection pump air bound (vent air from fuel system).
Insufficient fuel, filter clogged, supply pump not working properly.
Clutch slipping, exhaust pipe or air cleaner clogged or restricted.

(Also see "Lack of Compression" and "Overheating".)

KNOCKING:

Loose piston pin, connecting rod, camshaft or crankshaft bearing.
Broken piston rings or loose pistons.
Combustion knock in one or two cylinders generally indicates leaky injection nozzle valve.
General rough running usually due to improper timing of injection.
Poor grade of fuel, or water in fuel.
Excessive carbon in cylinder.

LACK OF COMPRESSION:

Sticky, dirty, pitted or improperly adjusted valves.
Stuck, worn or broken piston rings.
Worn pistons or cylinder sleeves.
Leaky cylinder head gasket.
Leaky gasoline starting valve.

(Also see "Lack of Oil Pressure".)

OVERHEATING:

Insufficient amount of water, fan belt slipping, excess load on engine.
Inside of radiator and cylinder block limed up or clogged with dirt.
Outside of radiator or radiator screen covered with dirt or chaff.
Lack of oil pressure, or water pump not working properly.
Water pump air bound.

ENGINE SMOKES:

Overloaded injection of fuel too early, lack of compression, poor grade of fuel, piston pumping lubricating oil.

EXCESSIVE LUBRICATING OIL CONSUMPTION:

Oil leaks, pistons pump oil, poor grade of lubricating oil being used, piston rings stuck in grooves.

If the injection pump does not perform properly, notify the proper maintenance personnel at once.

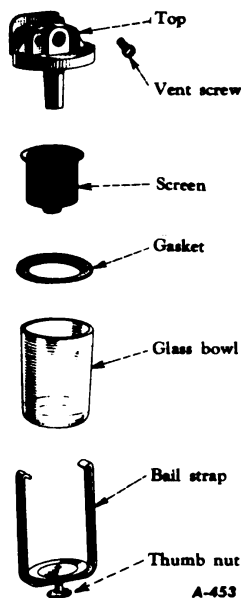
DIESEL FUEL WATER TRAP

Clean fuel is an important factor for successful Diesel engine operation. The fuel is strained and filtered between the tank and the injection pump by the fuel water trap and filter.

CLEANING

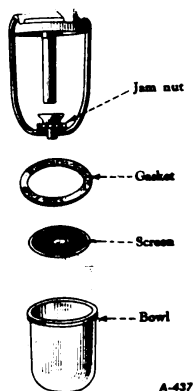
The fuel oil water trap, located on left hand side of engine, should be taken apart and cleaned at least every 64 hours. To do this, close fuel shut-off valve under the tank. Remove the bolt and remove the entire water trap from the engine. Then loosen the thumb nut under the water bowl and remove the bail strap. Then remove the glass bowl. Loosen the gasket and pull the screen off the tube. If the screen is dirty, wash the screen and the glass bowl in Diesel fuel; solvent, dry cleaning; or kerosene to remove all dirt and sediment. Reassemble the screen and the gasket. The gasket must be in its proper place, and in good condition. Reassemble the glass bowl and the strap and tighten the thumb nut by hand. Then assemble the entire water trap to the bracket by tightening the bolt.

After reassembling, open the fuel shut-off valve under the tank, then open the vent screw to vent any air. See Instructions on page 4 for venting the air.



Illust. 1
Fuel Strainer and Water Trap

CLEANING THE GASOLINE STRAINER AND SEDIMENT BOWL



Illust. 2
Gasoline Strainer Showing Glass
Bowl Removed for Cleaning.

The gasoline strainer, located under the gasoline tank, should be cleaned at the interval specified under "Periodical Inspections," page 14, Section G. To clean the strainer close the gasoline shut-off valve and take the strainer apart by loosening the lower jam nut and disassembling the strainer. Clean the screen and sediment bowl if necessary.

When reassembling the strainer be sure the cork gasket between the bowl and the main body is in good condition and does not leak.

OPERATIONS SECTION

DIESEL FUEL FILTER

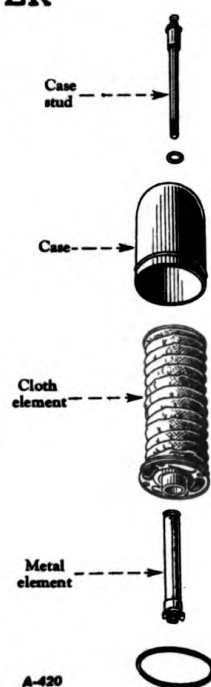
COMBINATION CLOTH AND METAL ELEMENTS

The Diesel fuel filter located on the left side of engine should be taken apart and the elements cleaned regularly at the interval specified in the "Lubrication Guide".

TO CLEAN THE ELEMENTS

(1) Remove the case stud and the case.

(2) Remove the elements and wash both the metal and cloth elements with kerosene or fuel oil. After cleaning the fuel filter elements, vent the air from the injection system before operating on the Diesel cycle. This should be done as described on page 4.



Illustr. 3
Showing the Diesel Fuel Filter
Taken Apart for Cleaning.

GOVERNOR

The governor of this engine is an integral part of the fuel injection pump and is fully enclosed and sealed at the factory. It operates in a bath of oil and its function is to maintain the engine speed selected by the operator and to automatically proportion the fuel to the load.

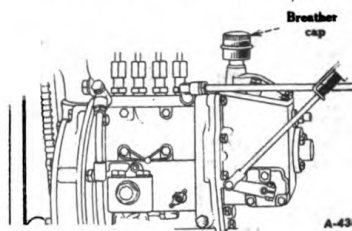
ENGINE SPEED

Never operate the engine at more than the regular governed speed. Excessive speeds are harmful.

The rated or maximum full load governed speed is 1350; maximum idle speed is 1470 to 1530 R.P.M.; minimum speed (hand throttle) is 425 R.P.M.

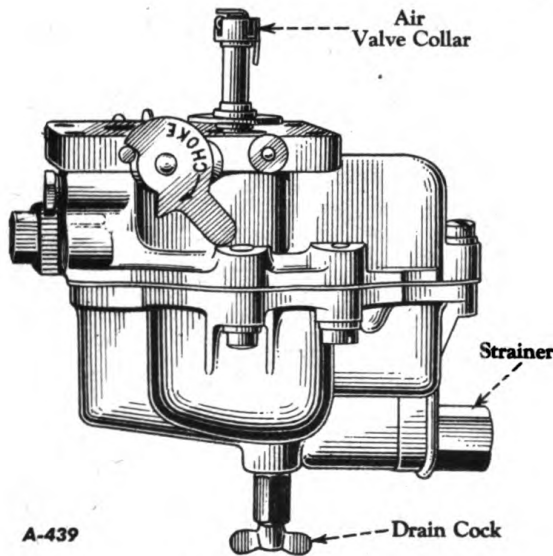
CLEANING GOVERNOR BREATHER CAP

The breather cap should be removed and cleaned every 240 to 256 hours, or more often if dusty conditions require it. To clean the breather, wash it in Diesel fuel; solvent, dry cleaning; or kerosene, dip it in engine lubricating oil and replace it after the excess oil has been wiped off.



Illustr. 4

DIESEL DUAL MANIFOLD STARTING CARBURETOR



Illustr. 5
Starting Carburetor

The Diesel dual manifold starting carburetor is used only when starting the engine. The gasoline level is controlled by a conventional float and float valve mechanism when starting and running on gasoline. The float valve is locked into its seat, shutting off the gasoline supply to the fuel bowl when the engine is changed over to operate on the Diesel cycle.

The float valve is protected against dirt and foreign material by a strainer. This strainer should be removed occasionally and cleaned.

NOTE: Periodically, check the screw which fastens the fuel bowl to the fuel bowl cover; also see that the cover screws are kept tight to prevent any leakage of air past the fuel bowl cover gasket.

TO CLEAN STRAINER

- (1) Close the gasoline shut-off valve at the gasoline tank.
- (2) Disconnect the gasoline pipe at the carburetor.

- (3) Unscrew the strainer fitting from the carburetor, wash it in Diesel fuel; solvent, dry cleaning; or kerosene and reassemble.

- (4) Open the gasoline shut-off valve.

ADJUSTMENT

The speed of the engine, when operating on gasoline, is controlled by the amount of opening of the air valve. The maximum valve opening is set by the adjustment of the air valve collar. This opening should be 9/64-inch.

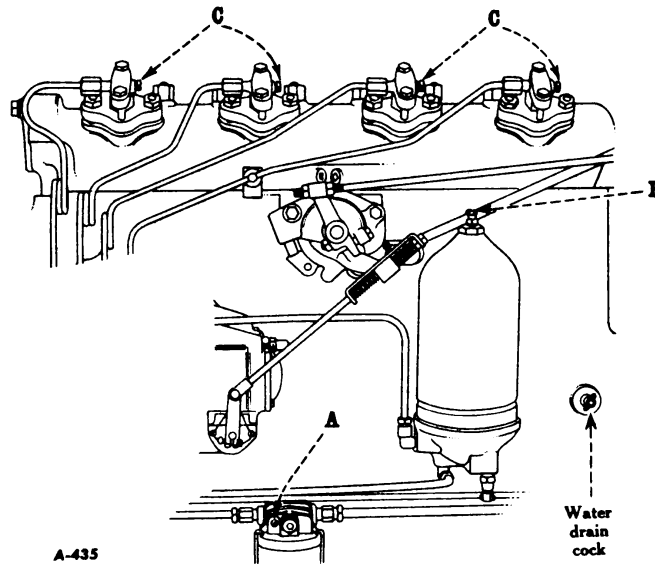
The starting choke regulates the air for starting.

CAUTION: The present day grade of gasoline has a tendency to form gum. It is necessary therefore, that the gasoline tank and the fuel bowl be completely drained of fuel when the engine is to be out of service for more than two weeks.

These gum deposits can be completely dissolved with a mixture of one part of alcohol and one part of benzol, or with acetone.

OPERATIONS SECTION

VENTING AIR FROM INJECTION NOZZLES, FUEL FILTER AND WATER TRAP



Illustr. 6
Air Vents at Fuel Filter
and Injection Pump Nozzles.

NOTE: The engine will fail to run on the Diesel cycle if there is any air in the fuel injection system. If air is present in the fuel injection system, it will be necessary to bleed the air from the system by following the procedure outlined below:-

To remove the air, it is necessary to bleed the system by opening the vent cocks successively on the water trap, fuel filter and injection nozzles.

(1) With the fuel tank shut-off valve open, open the vent cock "A" on the water trap (with engine stopped).

(2) Close the vent cock when the fuel starts to flow.

(3) Open the fuel filter vent cock "B"; then start the engine. With the engine operating on the gasoline cycle, advance the engine speed control lever slightly while venting the fuel and injection line.

(4) Close the vent cock when the fuel starts to flow.

(5) Open each nozzle vent "C" individually. Close each cock when the fuel starts to flow.

REMOVING AND REPLACING FUEL INJECTION PUMP

In case it becomes necessary to remove the complete fuel injection pump from the engine, the following instructions should be followed:

- (1) Keep all parts clean.
- (2) Before removing any fuel lines from the pump, first thoroughly clean the pump and connections with fuel oil. When the lines are removed the connections on the engine should be covered to prevent dirt from entering the system.
- (3) Close the fuel shut-off valve at the tank (*see Illust. 2, Section G*). Put the compression release lever in the gasoline position. Disconnect the center terminal at the magneto distributor cover.
- (4) Disconnect all the fuel lines attached to the injection pump.
- (5) Disconnect the injection pump control rod.
- (6) Remove the pump gear cover and remove the cap screws "A" holding the hub, gear and pointer together (*see Illust. 7*).
- (7) Remove the complete injection pump assembly after taking out the four screws at the rear of the timing gear compartment and the one at the front inside.

TO REPLACE INJECTION PUMP

(*See Illust. 7*)

- (1) Crank the engine until the No. 1 cylinder is at the top dead center of the compression stroke. This position can be determined by removing the No. 1 spark plug, placing the thumb over the opening and cranking the engine slowly until an outward pressure is felt.

Continue cranking slowly until the notch marked "DC" on fan drive pulley is in line with the timing pointer in the front crankcase cover.

- (2) Check the pump gasket and the cover gasket to be sure they are clean, and assemble them in place.
- (3) Assemble the injection pump to the engine and secure it by center, inner and lower screws.
- (4) Place the injection pump gear "C" on the drive hub "B" and assemble the gear (with engine at the top dead center compression No. 1 cylinder), so that the chamfered tooth "D" on the gear lines up with the "DC" mark on the front cover "E" which is located at the right side of the opening above the center.

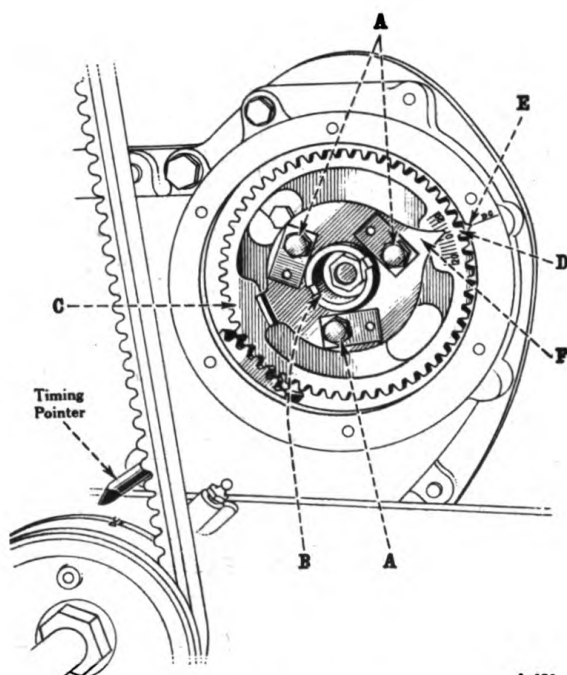
Under no conditions should an attempt be made to retime the engine with the front cover in place by matching the "K" marks on the injection pump gear and the idler gear.

- (5) Turn the injection pump gear hub "B" until the deep groove on the hub lines up with the "zero" graduation mark on the gear. Place the timing pointer "F" on the hub with the pointer at 0° position against the gear face. While in this position bolt the hub, gear and pointer together with the cap screws "A" in this position.

- (6) Replace the fuel pump gear cover. Reconnect the controls and fuel lines. Replace the magneto terminal and the spark plug. Turn on the fuel.

- (7) Start the engine, bleed the fuel system (*see page 4*), and reset the injection timing as required (*see page 6*).

INJECTION PUMP TIMING



A-451

Illust. 7
Injection Pump Timing.

The injection timing may be advanced or retarded by means of the slots in the gear. This adjustment must be made when engine is not operating.

The injection pump is fitted with a timing adjustment. The pump timing adjustment indicator is bolted through the slots in the injection pump gear to the gear hub. The gear hub is keyed to the injection pump shaft. The pump gear timing indicator can be seen by removing the pump gear cover.

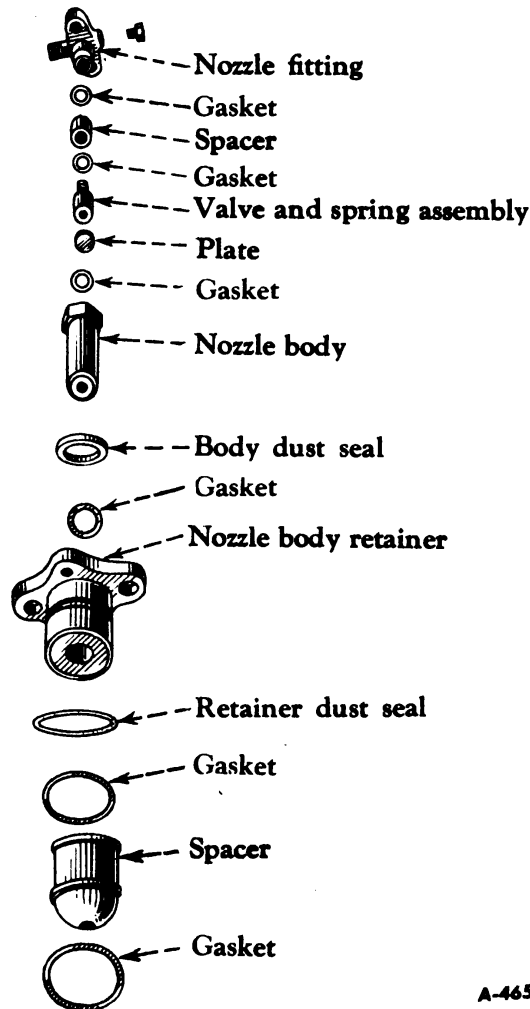
The adjustment is normally set with the indicator on the center mark of the graduations on the pump gear. To assure the best operating conditions, the indicator can be tried on either side of the center mark and set at the best operating position.

To change the location of the indicator, "F", loosen the cap screws "A" which hold the indicator and the gear hub "B" to the gear "C", and turn the gear hub "B" until the indicator is at the desired position. Then tighten the cap screws "A" (see Illust. 7).

For advanced position, turn the gear hub clockwise and for retarded position, turn the gear hub counterclockwise.

The correct adjustment is obtained when the engine speed is maximum for a fixed load and the engine operation is smooth with a clean exhaust.

INJECTION NOZZLE



A-465

Illustr. 8
Injection Nozzle.

If any cylinder seems to fire too noisily, it probably is an indication that the injection nozzle valve is leaking badly. If this occurs, clean the nozzle and fitting thoroughly with clean fuel oil. Remove the nozzle and disassemble it. A leaky valve will gen-

erally have a black appearance. Clean the valve and seat, and wash in clean Diesel fuel; solvent, dry cleaning; or kerosene (*see Illustr. 8*).

The nozzle plate should be free of carbon. There should be no carbon in the nozzle body spacer.

OPERATIONS SECTION

MEMORANDA

GENERAL ENGINE LUBRICATION

The life of any engine depends on the care it is given. Proper lubrication is very important.

This engine has a pressure feed lubrication system. A gear type oil pump circulates the lubricating oil under pressure to the crankshaft bearings, connecting-rod bearings, valve mechanism, timing gears, and governor, thereby assuring positive lubrication of all parts.

The engine is equipped with two oil filters which clean the oil continuously while the engine is running. To obtain the full benefit from the filters, the elements should be replaced with new ones every time the oil in the crankcase is changed. (See "Lubrication Guide" for the proper oil change interval.) (Cleaning the old elements is not satisfactory.)

OIL LEVEL GAGE

Do not run the engine for any length of time when the level of the oil is below the low mark on the gage.

To test the oil level with the bayonet gage, unscrew the wing nut, remove the gage, wipe it clean and insert it in crankcase until wing nut rests on top of the gage sleeve threads. Do not screw nut onto the sleeve. Remove gage and read oil level. **NOTE:** Do not check oil level while the engine is running.

OIL PRESSURE INDICATOR

An oil pressure indicator indicates the pounds of pressure of the oil circulating through the engine. Under all operating conditions, the pressure of the oil in the engine should hold the indicator in the white section of the gage. Should the indicator not register, stop the engine at once and inspect oil system to find the cause of failure. If unable to find the cause, notify proper maintenance personnel.

Always look at the oil pressure indicator immediately after starting engine.

OIL PUMP

The gear type oil pump in the crankcase has a screen attached to the oil intake which stops the large dirt particles from entering the oiling system. This screen should be cleaned whenever the oil pan is removed. The oil intake floats on top of the oil in the crankcase and draws the oil from the surface, thus eliminating the possibility of mixing water or sediment with the oil.

IMPORTANT!

Engines shipped to destinations in the United States of America, Canada and Mexico are filled with thinned SAE-10 oil before leaving the factory. This oil, as shipped from the factory, may be used when operating in air temperatures below zero F. (until the next regular oil change). For temperatures above 0° F., use engine oil as specified under the proper temperature range, in the "Lubrication Guide".

After changing to a lighter grade of oil, the engine should be started and run at least 5 to 10 minutes, so that the lighter oil is worked into the bearings and on cylinder walls.

Change oil at the proper interval as indicated in the "Lubrication Guide". Drain crankcase lubricant while the oil is warm so it will drain freely. (All lubricating oil is drained from the crankcase of engines for export. See "Lubrication Guide" for oil to use.)

ENGINE LUBRICATING OIL

Engine lubricating oil shall be of well-refined petroleum oils, free from water, sediment, and without admixtures of fatty oils, acids, soaps, resins or any other substance not derived from petroleum. Oil shall not corrode any metal used in engine construction. Also engine lubricating oil containing additive products not necessarily derived from petroleum, but being of non-corrosive type, is satisfactory for use in our engines.

See special instructions for "COLD WEATHER OPERATION" on pages 11 and 12 of Section G.

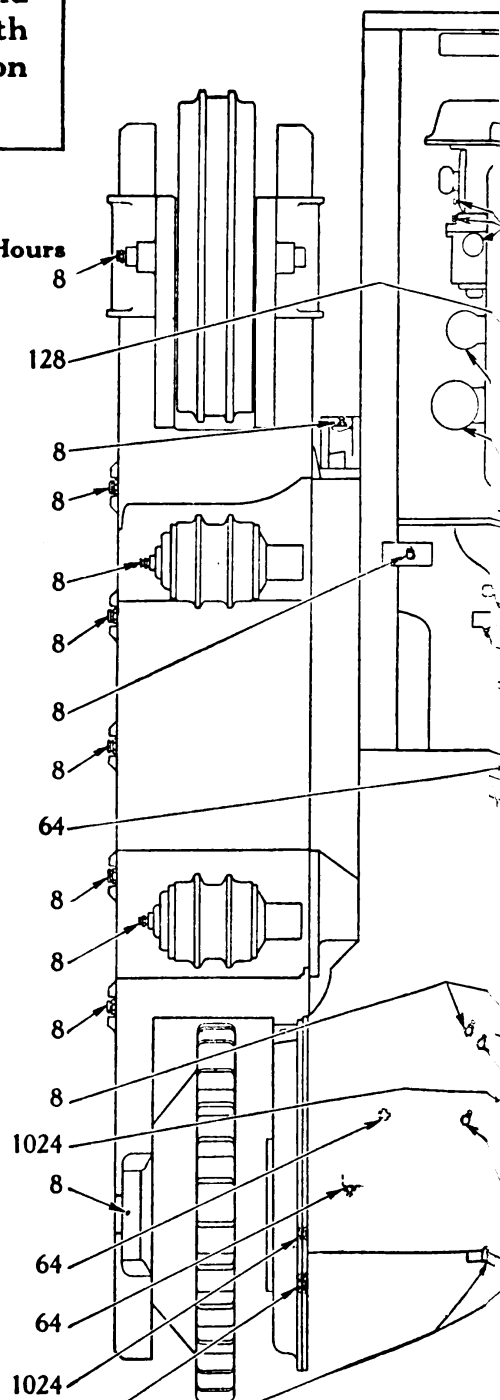
Manufacturer's Serial Number located on plate on upper left-hand corner of dash.

CAUTION! All points indicated by short-shaft, dotted arrows are points that are on both sides of vehicle and must be serviced in accordance with instructions for similar point on opposite side.

INTERVAL	
8 =	8 hours
64 =	64 hours
96 =	96 hours
128 =	128 hours

CHECK DAILY
Crankcase, Air Cleaner, Pump (if used)

	Lubri- cant Hours	
Front idler (see table). (Note 13).....	GO	8
Crankcase drain plug. (Note 3).....	..	128
Track frame guide roller.....	CG	8
Track roller (see table). (Notes 8 and 13)	GO	8
Track idler (see table). (Note 13).....	GO	8
Track roller (see table). (Notes 8 and 13)	GO	8
Steering brake pedal shaft.....	CG	8
Track roller (see table). (Notes 8 and 13)	GO	8
Engine clutch compartment drain plug. } (Note 8)	..	64
Track roller (see table). (Notes 8 and 13)	GO	8
Track idler (see table). (Note 13).....	GO	8
Track roller (see table). (Notes 8 and 13)	GO	8
Steering clutch release bearings.....	CG	8
Transmission drain plug.....	..	1024
Track frame pivot.....	CG	8
Steering clutch compartment drain plug. } (Note 8)	..	64
Steering clutch pilot bearing. (Note 9).. CG	64	64
Final drive drain plug.....	..	1024
Final drive (see table) (fill and level plug). } (Note 7)	GO	128
Track frame diagonal braces.....	CG	8

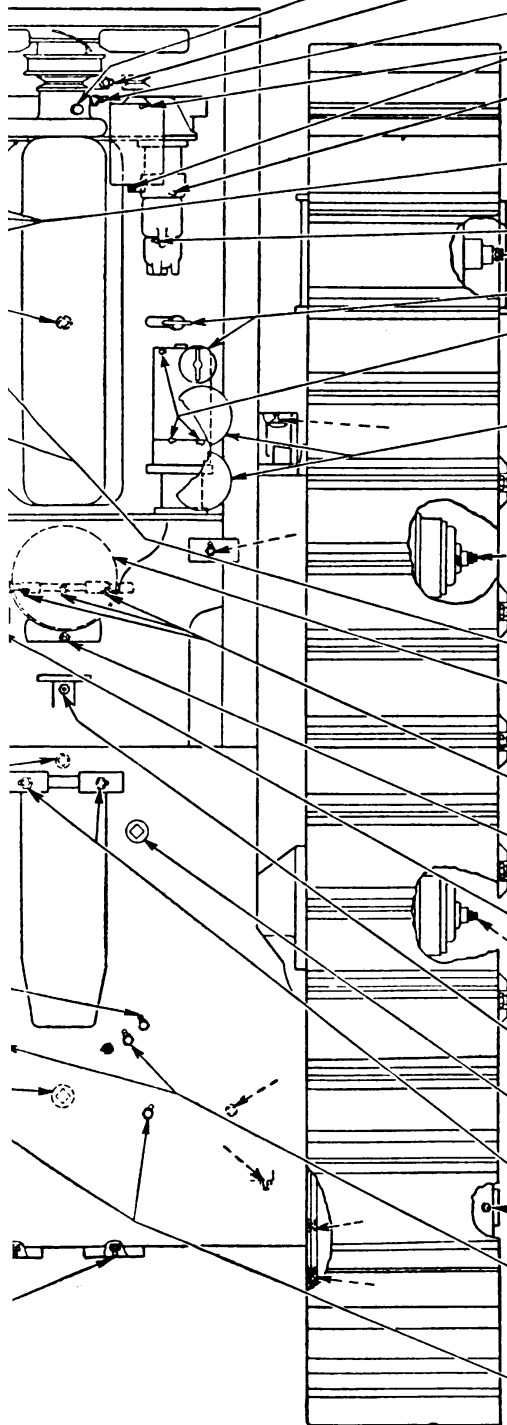


LUBRICATION GUIDE FOR TD-14 TR

S

56 = 256 hours
12 = 512 hours
24 = 1024 hours

and IHC Injection



SERVICED FROM UNDER HO

Lubri-
Hours cant

- | | | |
|-----|----------|--------------------------------------|
| 8 | CG | Water pump shaft (sparingly) |
| 64 | CG | Front engine support |
| 64 | CG | Fan hub bearing (sparingly) |
| 64 | OE | Generator (sparingly) |
| 64 | PS or PL | { Magneto impulse coupling |
| 128 | OE | Injection pump and governor. (N |
| 512 | PS or PL | { Magneto distributor bearing. (No |
| 128 | OE | { Crankcase (see table). Drain, refi |
| 256 | OE | { Starter (sparingly). Remove cove |
| | | oil cups. |
| 128 | .. | Oil filters. (Note 5) |
| 128 | .. | Fuel filters. (Note 4) |
| 8 | OE | Air cleaner. (Note 6) |
| 64 | CG | { Engine clutch camshaft bearings |
| | | cover and turn crank to reach fi |
| 64 | CG | Engine clutch release bearing |
| 64 | CG | Engine speed control lever |
| 64 | CG | { Engine clutch pilot bearing. (Ren |
| | | reach fittings.) |
| 128 | GO | { Transmission (see table). Fill p |
| | | gage. (Note 7). |
| 8 | CG | Steering clutch lever bearings |
| 8 | CG | Steering clutch fork lower bearings |
| 8 | CG | Steering clutch fork upper bearings |

6

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6

4

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4

TRACK ASSEMBLIES

If the track chain is too loose it may have a tendency to climb the sprocket when backing the tractor.

When the track adjustment is either too tight or too loose, it causes undue wear on the track links, pins, bushings and bearings, and also on the front idler bearings.

The two heavy coil springs in each track frame are properly set at the factory and require no adjustment. Their purpose is to allow the front idler to recoil under shock but exert no tension on the track when in normal operating position.

On a new unit check the track shoe bolts every 8 hours of operation until it becomes evident that set has taken place. The evidence of set having taken place can be determined when the bolts retain a tightness of 190 to 200 ft. - lbs. The bolts used for attaching the track shoes to the tracks are heat-treated alloy bolts and they will stand considerable tightening strain (common bolts should not be used.)

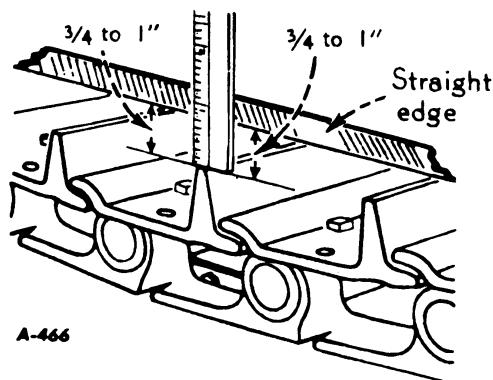
While tightening the bolts it is well to strike the head of the bolt several sharp hammer blows and re-tighten. As a safety measure we

recommend you use goggles to protect your eyes while striking the bolts.

METHOD OF CHECKING SLACK IN TRACK CHAIN

To check the slack in the track chain, the chain must be tight everywhere except on the top, between the front idler and the sprocket. This can be accomplished by placing a wooden block, approximately one foot in height, under the foremost track shoe lug; then, with the engine running, put the tractor in low gear and engage the clutch just enough so the sprocket drive tightens the chain along the ground and around the sprocket. After locking the brake and stopping the engine, stand on top of the track chain. Your weight will pull the chain tight around the front idler. All the slack should now be in the top part of the track chain.

Using a string or a straight edge align the tips of the track shoe cleats across each of the three spans between the top idlers and sprocket and front idler. The sag of the chain under the straight edge of each span should be approximately $\frac{3}{4}$ to 1 inch. (See *Illust. 1*).



Illust. 1
Check Slack in Track Chain.

TRACK ASSEMBLIES

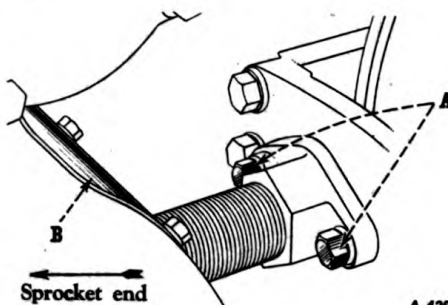
TO ADJUST TRACK CHAIN

(See *Illust. 2*)

If adjustment is necessary, remove the small cover plate "B" at the front of the equalizer spring housing and loosen the track spring adjuster lock bolt just inside the housing. Remove the two cap screws "A" at the front of the track spring adjuster. Turn the adjuster clockwise, as viewed from rear (sprocket end); this pushes the front idler forward, tightening track chain. Turn the adjuster counterclockwise to loosen the track chain.

After the correct adjustment has been obtained, replace the cap screws "A", tighten the lock bolt and replace the cover plate "B".

After the track chain has been thoroughly broken in it is well to check the slack and adjust it if necessary.



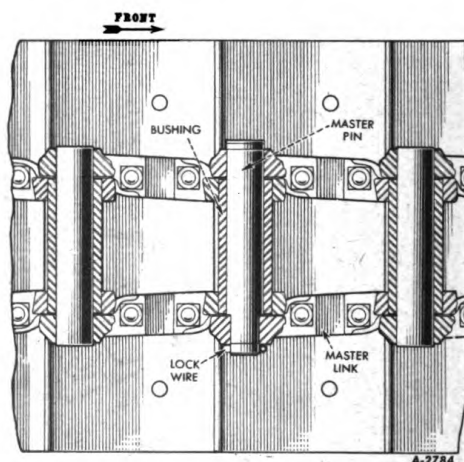
Illust. 2
Adjusting Track Chain.

REMOVING THE TRACK

To remove the entire track from the tractor, drive the tractor forward until the track link master pin is in the front of the front idler. The tractor should be level when removing the track chain. Loosen the tension in the track chain by turning the adjuster counterclockwise as described under "TO ADJUST TRACK CHAIN".

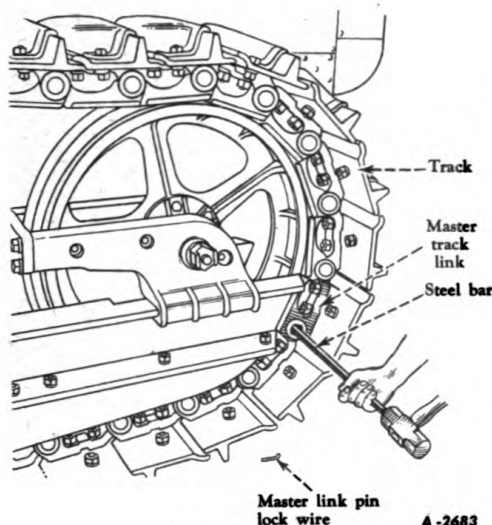
Remove the track link master pin by removing the master pin lock wire and driving out the master pin (see *Illust. 4*). Run the tractor backward until it is at the end of the track. Place a plank flush against the rear of the track when the track is flat on the ground as shown in *Illust. 5*. The plank should be approximately the same thickness as the track, narrow enough to fit between the track frame shields, and long enough so the entire tractor can rest on the plank. Now, back the tractor off the tracks and on to the plank.

NOTE: If it is desired to replace the old track with a new one, remove the old track as mentioned previously and place the new track flush against rear of the old track when the track is flat on the ground.



Illust. 3
Track Link Master Pin Assembly.

REMOVING THE TRACK - Continued



Illust. 4
Master Link Pin Removal

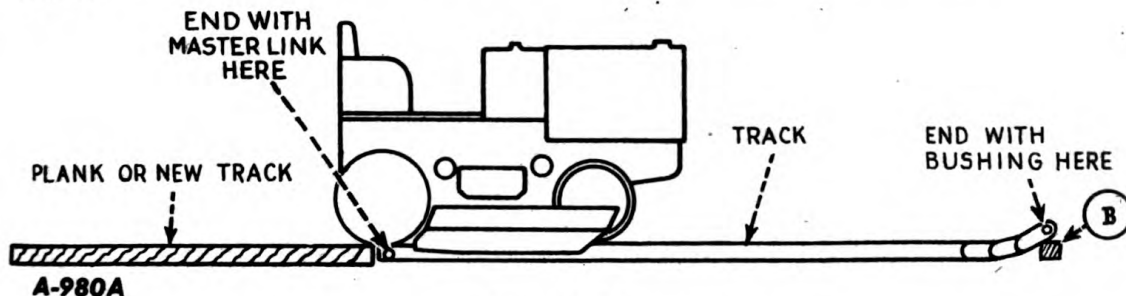
When replacing the track, place the track flush against the plank. The end with the bushing should be in the position shown in *Illust. 5*. Run the tractor forward on to the track until the sprocket is slightly ahead of the rear end of the track. Put a crowbar through the master pin hole and pull track up around the sprocket and forward over the track idlers and front idlers as the tractor is driven forward.

CAUTION: Drive the tractor forward in low speed with the engine speed control lever in the idle position and ride the brakes so that the tractor does not go too fast.

Place a block (about 8 to 10 inches high) under the cleat of the shoe on the last link of the track at "B", *Illust. 5*, to hold the track against the idler. Engage the engine clutch and apply just enough power in forward speed to take the slack out of the bottom part of the track. Then, replace the master pin and the lockwire. Adjust the tension in the track chain as described on page 1.

TRACK ROLLER LUBRICATION

It is important that the track rollers have the proper lubrication. (See "Lubrication Guide", section 8, for further information).



Illust. 5

OPERATIONS SECTION

MEMORANDA

TracTractor Model TD-14

REPAIR SECTION

The various assemblies in this tractor are arranged alphabetically, in sections, according to their function.

Each section has a black tab which lines up with the corresponding section name and number shown at the right. The black tabs are quickly located by bending this book back.

The contents of each section can be determined at a glance by referring to the index on the other side of this page.

NOTE: Refer to Section 14, page 1, for important note on tolerances clearances and oil seals.

COOLING SYSTEM 1

ELECTRICAL 2

ENGINE 3

ENGINE CLUTCH 4

FINAL DRIVE 5

FRAME 6

FUEL SYSTEM 7

POWER TAKE-OFF 8

POWER TRAIN 9

STARTING SYSTEM 10

STEERING
MECHANISM 11

TRACK 12

TRANSMISSION 13

SERVICE CHARTS 14

REPAIR SECTION

CONTENTS

	Page No.		Page No.
COOLING SYSTEM		Track frame pivot.....	5
Fan.....	1, 2	Track frame and spring.....	3, 4
Radiator.....	1, 4, 5	FUEL SYSTEM	
Thermostat.....	1, 2	Fuel injection pump.....	2 to 19
Water Pump.....	1 to 3	Injection nozzles.....	1, 2
ELECTRICAL		POWER TAKE-OFF	
Generator and relay.....	18 to 21	Belt pulley.....	8 to 11
Magneto.....	1 to 18	Front power take-off coupling.....	1, 2, 3
Starting motor.....	22 to 25	Rear power take-off.....	3
ENGINE		Reduced speed power take-off.....	4 to 7
Air cleaner.....	1	POWER TRAIN	
Camshaft.....	6, 7, 12, 13	Line of power.....	1
Connecting rods.....	14, 15, 16	STARTING SYSTEM	
Crankcase and pan.....	20, 21, 22	Adjustment of starting control mechanism.....	2, 3, 5
Crankcase front cover.....	22	Carburetor.....	5 to 8
Crankshaft.....	14, 15, 16, 17, 19	Intake manifold.....	3, 4
Cylinder head.....	5 to 9	Operation.....	1, 2
Cylinder sleeves.....	14, 15, 18	Spark plugs.....	9
Lubrication.....	1, 2, 3	STEERING MECHANISM	
Manifold.....	1	Steering brakes.....	6, 7
Oil filter.....	2	Steering clutches.....	1 to 5
Oil pump.....	3, 4, 5	TRACK	
Pistons.....	14, 15, 17, 18	Front idlers.....	4 to 7
Starting mechanism.....	8	Track chain.....	1, 2
Timing gears.....	17	Track idlers.....	4, 5
Valves.....	6 to 12	Track rollers.....	2 to 4
ENGINE CLUTCH		TRANSMISSION	1 to 5
Engine clutch and connections	1 to 5	SERVICE CHARTS	
FINAL DRIVE		Engine.....	.....
Drive bevel gear.....	1 to 3	Final drive.....	.....
Sprockets and sprocket drive.....	3 to 7	Tractor.....	.....
FRAME			
Equalizer spring.....	7, 8		
Main frame.....	1, 2		
Rigid track frame.....	9, 10		
Track frame.....	2 to 5		
Track frame diagonal brace.....	5, 6, 7		
Track frame guide.....	5, 6		

COOLING SYSTEM

Specifications

Type	Centrifugal Pump Circulation
Radiator . . . . .	.IHC Flat Tube
Thermostat, opens at	165°
Thermostat, wide open at	190°
"V" Belt Drive	Adjusted by turning one flange of pump pulley
Capacity U.S. Gallons.	20
Water Pump Capacity G.P.M.	87
Fan Diameter, inches	20
Fan Blades, number	4
Fan R.P.M.	2,079

Water Pump

A positive, centrifugal pump circulates water in the closed system between the engine block, cylinder head, and radiator. The temperature is controlled by a thermostat of the by-pass type, set in the casting attached to front of the cylinder head. The path of the water circulation when the engine is cold is from the radiator bottom, up through the pump, through the engine block, up to the cylinder head, and out into the thermostat, through the thermostat, and is by-passed back into the pump. Any water escaping into the radiator is made up from the supply at the bottom of the radiator.

This circulation during the warm-up period prevents formation of steam pockets. The thermostat starts to open at 165°. The temperature controls the opening of the thermostat which in turn controls the amount of water recirculated through the pump and also the amount of cooler water added from the radiator.

With the thermostat in the wide open position (190°F.), the by-pass is closed, no water is circulated through the pump and flow is

from the cylinder head through the radiator and back to the pump.

The fan assembly, and drive pulley run on ball bearings mounted on a sleeve, (22), *Illust. 1*, is a press fit in the water-pump body, (28). The impeller, (17), is driven through a full-floating type shaft.

Refer to the "Operations Section" for tightening packing, replacing packing, and adjusting fan belt tension.

Removal of the Water Pump

The water pump can be removed after disconnecting the hose, removing the fan, fan belt, and bolts holding the pump to the crankcase. A gasket is used between the pump and crankcase at each point where a bolt is used to fasten the pump to the crankcase.

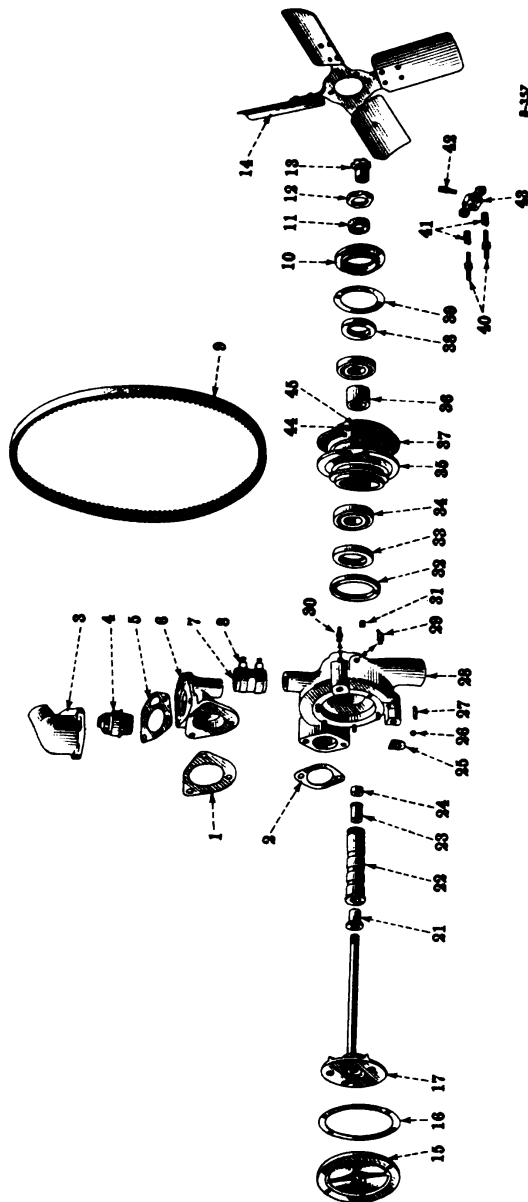
Disassembly of the Water Pump

Remove the fan and parts mentioned in preceding paragraphs.

Then take off the bearing retaining nut (12), *Illust. 1*, retainer (10), gasket (39), oil seal (38) and

REPAIR SECTION

COOLING SYSTEM - Continued



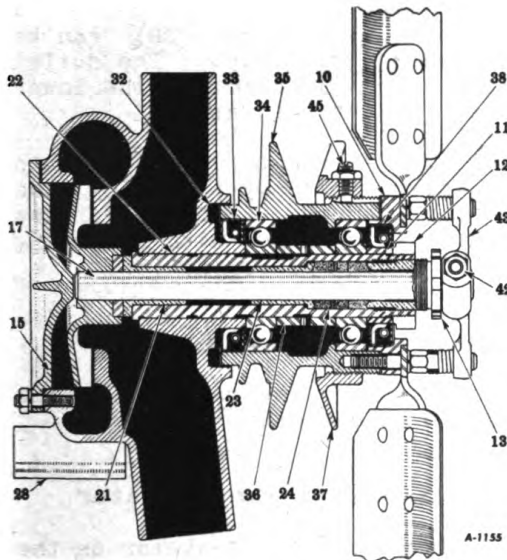
Illustr. 1 - Exploded View of the Water Pump.

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Gasket.	15	Cover.	33	Oil seal, rear.
2	Gasket.	16	Gasket.	34	Bearing.
3	Thermostat housing.	17	Impeller, with shaft.	35	Pulley hub, with oil seal.
4	Thermostat (1650-1900).	21	Thrust bushing.	36	Spacer.
5	Gasket.	22	Sleeve, with bushings.	37	Pulley flange.
6	Outlet elbow.	23	Bushing.	38	Oil seal, front.
7	Hose (1-5/8" I.D. x 2-3/8" long).	24	Packing.	39	Gasket.
8	Hose clamp.	25	Body spacer.	40	Driving stud.
9	Fan belt.	26	Plug.	41	Spring.
10	Bearing retainer.	27	Body stud.	42	Pin.
11	Bearing lock sleeve.	28	Body, with plug and studs.	43	Driver.
12	Nut.	29	Lubricator.	44	Hex. jam nut, 5/16" N.C.
13	Packing gland.	30	Lubricator cap.	45	Set screw, 5/16" N.C. x 7/8".
14	Fan.	31	Felt washer.		
		32			

COOLING SYSTEM - Continued

Disassembly of the Water Pump - Continued from page 1

bearing, lock sleeve (11). Support the pulley hub (35) in a press and push on the forward end of sleeve (22), removing the sleeve, body, and rear bearing from the pulley assembly. The front bearing can be removed from the hub (35). Be careful to support both races when removing the bearing.



Illustr. 2 - Cross-Section of the Water Pump. 10. Bearing Retainer; 11. Bearing Lock Sleeve; 12. Nut; 13. Packing Gland; 15. Cover; 17. Shaft with Impeller; 21. Bushing; 22. Sleeve; 23. Bushing; 24. Packing; 28. Body; 32. Felt Washer; 33. Oil Seal; 34. Bearing; 35. Pulley Hub; 36. Spacer; 37. Adjusting Flange; 38. Hub Oil Seal; 42. Driver Pin; 43. Driver; 45. Set Screw.

Repair of the Water Pump

The running clearance of the impeller shaft in the bushings is .0015" to .0025". When wear is sufficient, the bushings (21) and

(23) can be replaced with service parts reamed to size. The sleeve (22) is a press-fit in the pump body (28). The impeller shaft (17) is .6215" to .6220" in diameter.

Reassembly of the Water Pump

If the sleeve (22) has been removed, press it back into the body (28). Place the felt washer (32) slightly oil soaked, in the groove in the pump body. Assemble the rear bearing (34) to the hub (35), then put the oil seal (33) in the hub, with the lip toward the bearing and the outside edge of the seal flush with the end of the hub.

Place the spacer (36) in the hub (35) and assemble the front bearing in the hub. Grease the bearings with the grease specified in the "Lubrication Guide." Line up the spacer (36) with the inner races of the bearings and press the assembly on the sleeve (22). Weld a couple of spacers together and use them to drive the hub assembly on the sleeve (22). Be sure the rear bearing is against the pump body. Support the sleeve (22) while pressing on the hub.

Assemble the oil seal (38) to the retainer (10) with the lip toward the fan when assembled to the pump.

Place the bearing lock sleeve (11) on the sleeve (22), then the gasket (39), and bearing retainer (10), lining up the holes in the bearing retainer, gasket and hub. Screw the bearing retaining nut (12) on the sleeve (22) and tighten. Place the impeller (17) in the pump, add the packing (24), packing nut (13), fan, and the driver assembly. Replace the cover (15) and gasket (16).

Replacement of the Water Pump

The replacement is the reverse of the removal. Be sure all gaskets are new and are in place between the pump and crankcase. Adjust the fan belt tension as covered in the "Operations Section".

COOLING SYSTEM - Continued

Radiator

Removal of the Radiator

The water must be drained from the system before removing the radiator. Then remove the muffler and engine hood sheet and disconnect the head lamp at the head lamp junction block. The junction is located on the lower right side of the radiator. Disconnect the water hoses (27) and (24), *Illust. 3*, at clamps (17) and (23). Close the gasoline shut-off valve under the starting fuel tank attached to the radiator. Disconnect the fuel line from the tank to the carburetor and remove the gasoline tank from the radiator. Remove the radiator guard and then the radiator grille (2) and screen (33) complete. The radiator assembly can then be lifted out of the tractor.

Disassembly of the Radiator

Remove the fan housing sheets (31) and (32) from the rear side of the radiator assembly. The upper water

tank (8) can be removed by taking out cap screws in the core spacers (7) and (30) and also by removing the cap screws from the core stiffeners (6) and (18).

The lower water tank (22) can be removed the same way. The outlet elbow (25) is held to the lower water tank by cap screws.

The core (3) can be reassembled to the water tanks by reversing the above procedure. The overflow pipe (5) is attached with a fitting to the upper water tank (8).

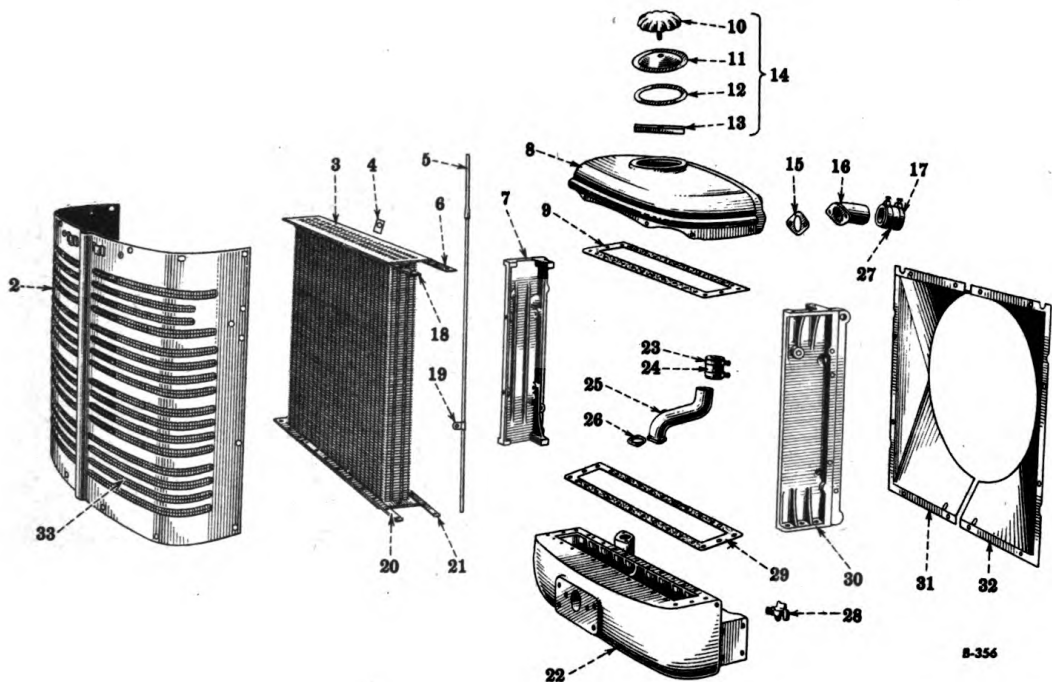
Reassembly of the Radiator

Reassembly of the radiator is the reverse of disassembly.

Replacement of the Radiator

Replacement of the radiator on the tractor is the reverse of removal from tractor.

COOLING SYSTEM - Continued



Illust. 3 - Exploded View of the Radiator.

Ref. No.	Description	Ref. No.	Description
2	Grille.	18	Stiffener, front.
3	Radiator core.	19	Clip.
4	Overflow pipe gasket.	20	Stiffener, front.
5	Overflow pipe.	21	Stiffener, lower, rear.
6	Stiffener, upper, rear.	22	Water tank, lower.
7	Core spacer, right hand.	23	Hose clamp.
8	Water tank, upper.	24	Outlet hose, 2-1/8" I.D. x 2-3/8" long.
9	Gasket.	25	Outlet elbow.
10	Cap handle.	26	Gasket.
11	Cap cover.	27	Inlet hose, 2-1/8" I.D. x 2-3/8" long.
12	Gasket.	28	Drain cock.
13	Cap clamp.	29	Gasket.
14	Cap, with clamp, gasket and handle.	30	Core spacer, left hand.
15	Gasket.	31	Fan housing sheet, right hand.
16	Inlet elbow.	32	Fan housing sheet, left hand.
17	Hose clamp.	33	Radiator grille screen.

REPAIR SECTION

MEMORANDA

ELECTRICAL SYSTEM

Ignition System

Magneto Type	International Harvester H-4
Rotation	Counterclockwise
Magneto Grounding Switch	Automatic in Manifold
Breaker Point Gap. . . . .	.013 inch
Spark Advance.	15°
Impulse Coupling Advance	T.D.C.
Magneto Gear, Helical.	27 Teeth
Drive.	Camshaft
Spark Plug Size. . . . .	.7/8-inch, 18, 15/16-inch Hex.
Spark Plug Gap . . . . .	.035 to .040 inch
Firing Order	1-3-4-2

Magneto

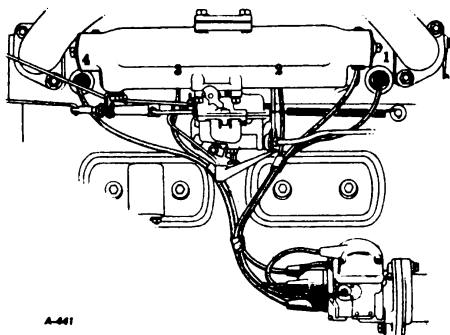
The magneto is driven through the impulse coupling which has a 150 R.P.M. missing speed. Throwout speed is 240 to 330 R.P.M.

The magneto, *Illust. 1*, has a completely enclosed breaker chamber, a starting impulse coupling, and an Alnico rotor magnet that should never require re-magnetizing. The exterior is extremely clean and all possible dirt-catching points have been eliminated. The flange is mounted to a drive bracket which is connected to the front plate of the engine. All shimming and lining up of various bolt holes when coupling the magneto to the engine is eliminated. Fine adjustment of timing is accomplished by rotating the magneto in slotted holes in flanges of the bracket and magneto.

Designed for operation with 4-cylinder engines, the entire mechanism is fully enclosed and protected against entrance of dirt, dust, and moisture. The condenser and coil are located underneath a plastic cover. The magnet is the rotating type, revolving between ends of pole pieces. Near the end of the magnet rotor

shaft is the cam which operates the breaker mechanism. The breaker mechanism is sealed from the coil and distributor compartment. The flat on the extreme end of the magnet rotor shaft drives reduction gears which drive the distributor arm. The distributor cap fits only one way and the No. 1 lead out is plainly marked.

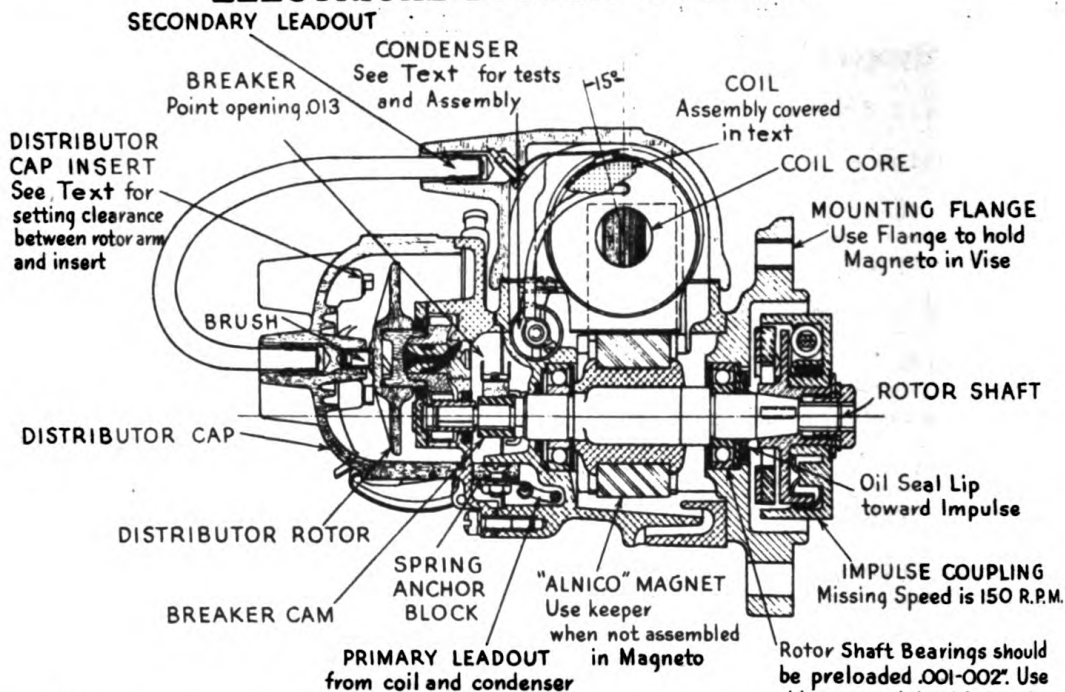
The serial number is stamped on the magneto frame and will identify the magneto and give all necessary information about it.



Illust. 1
Magneto Mounted on the Engine with Wires Connected. Engine Firing Order is 1, 3, 4, 2.

REPAIR SECTION

ELECTRICAL SYSTEM - Continued



A-1108

Illustr. 2

Cross Section of the International H-4 Magneto.

Removal of the Magneto

To remove the magneto, take off the switch cable by removing the fillister head screw and lock washer attaching the wire to the magneto. Pull the spark plug wires from the distributor insert sockets.

The magneto with impulse coupling and gasket are freed after removing the cap screws that secure the magneto to the bracket.

The bracket with the magneto drive can be taken off by running out four 3/8 inch x 1-1/2 inch cap screws that secure it to the front plate.

Replacement of the Bracket

To replace the bracket on the tractor, secure the bracket assembly with a gasket to the front plate with four 3/8 inch x 1-1/2 inch cap screws. The double punch mark on the magneto gear should

match the double punch mark on the camshaft gear. To see the timing marks, the crankcase front cover must be removed when replacing this bracket.

Replacement of the Magneto

Replacement of the magneto is described in the "Operations Section." Replace the spark plug wires. Replace the switch cable by using a screw with lock washer.

Disassembly of the Bracket

Removal can be accomplished as described above.

Bend back the nut lock (10) and run off nut (11), Illustr. 3, as the first step in disassembling the bracket.

Then, by pressing the drive shaft (6) out of the bracket the gear (9) will be freed. The gear may also be pulled from the shaft.

ELECTRICAL SYSTEM - Continued

Repair of the Bracket

The bushing in the bracket is replaceable, steel-back babbitt. When replacing the bushing, the 9/16 inch holes should be assembled to the front end of the bracket and arranged vertically to coincide with a similar opening in the bracket. The four 3/16 inch holes are then toward the magneto end. The end of the bushing should be flush with the front face of the bracket.

The shaft diameter is .9995 inch to 1.0005 inch and the bushings should be reamed to 1.0015 inch to 1.0030 inch. Replacement bushings should have a running clearance of .001 inch to .003 inch. Particular care must be taken while reaming this hole to have the bore square with the mounting face within .002 inch; if not, the gear will run out, causing a noisy timing gear train.

End clearance of the shaft and gear assembly is .003 inch to .013 inch.

Reassembly of the Bracket

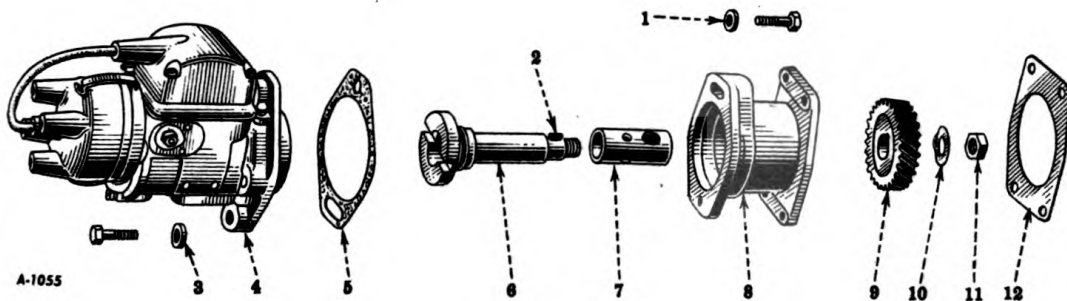
When reassembling, place the drive shaft (6), *Illust. 3*, in the bracket and assemble the key (2).

Press the gear on the shaft and secure it with nut (11) and lock washer (10). The flat side of the gear is assembled against the bracket for end-thrust contact. Check the face of the gear to make sure it runs true with the front surface of the bracket.

Replacement is accomplished as outlined above.

Impulse Coupling

The first purpose of the impulse coupling is to retard the spark at low engine speeds to approximately top dead center of the piston stroke, thereby preventing the engine from back-firing. Secondly, as the magneto member (7), *Illust. 6*, is retarded by the pawls (1), *Illust. 7*, (at low speeds these pawls are stopped by pawl stop pin (7), *Illust. 24*, the



Illust. 3
Exploded View of the Magneto Bracket Assembly.

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Washer.	5	Gasket.	9	Gear.
2	Key.	6	Shaft.	10	Nut lock.
3	Washer.	7	Bushing.	11	Hex. jam nut.
4	Magneto.	8	Bracket.	12	Gasket.

ELECTRICAL SYSTEM - Continued

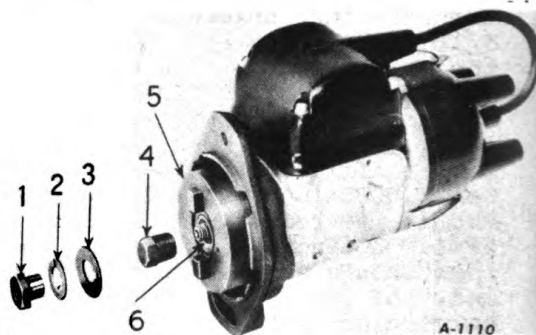
Impulse Coupling - Continued

lug (3) on the magneto member (7) compresses the impulse spring (1), *Illust. 6*. The lugs on driver (6) which continues to rotate at constant speed, trip the pawls (forces them away from the pawl pin) and the magneto member (keyed to the magneto rotor) is forced to rotate by the compressed spring at a greater speed than that of the drive member (6). The increased speed of the rotor provides a much hotter spark to the engine than would be provided by a direct drive to the magneto.

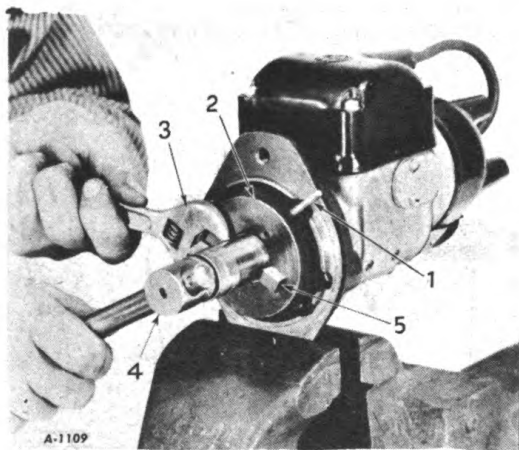
As the speed of the engine increases, the weighted ends (2) of the pawls (1), *Illust. 7*, are thrown out by centrifugal force and their short ends no longer engage the pawl pin in the mounting flange. The spark is no longer retarded. The missing speed, approximately 150 R.P.M., is the speed at which the impulse coupling no longer continually retards the spark. At this speed

it retards the spark intermittently only. Over the range of the throwout speed, 240 to 330 R.P.M., the impulse coupling should cease to function completely, giving the effect of a direct drive.

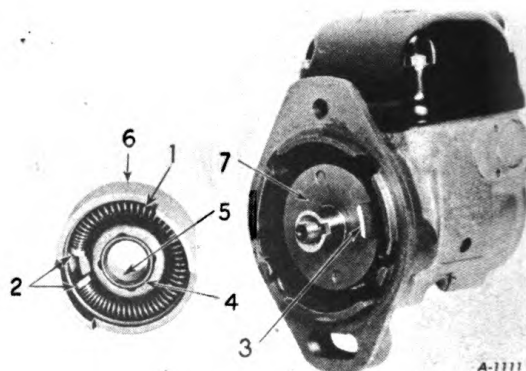
The engine should never be allowed to idle slowly enough to permit the impulse coupling to operate.



Illust. 5
Removing Impulse Coupling. 1. Impulse nut; 2. Lock washer; 3. Washer; 4. Service tool SE-912; 5. Impulse drive member; 6. Thread on inside of magneto member.



Illust. 4
Correct Method of Removing Impulse Coupling Nut. 1. Pin connecting hole in impulse driving member and lug of magneto member; 2. Impulse driving member; 3. Adjustable wrench; 4. Socket wrench; 5. Impulse pawl spring.



Illust. 6
Impulse Coupling Removed. 1. Impulse spring; 2. Impulse spring button; 3. Lug on magneto member; 4. Felt retainer; 5. Drive member hub; 6. Impulse drive member; 7. Impulse magneto member.

ELECTRICAL SYSTEM - Continued

Impulse Coupling - Continued

Its operation is denoted by a sharp click.

To remove the impulse coupling, insert a nail or pin through hole (1), *Illust. 4*, in the coupling drive member (2), locking the two elements together.

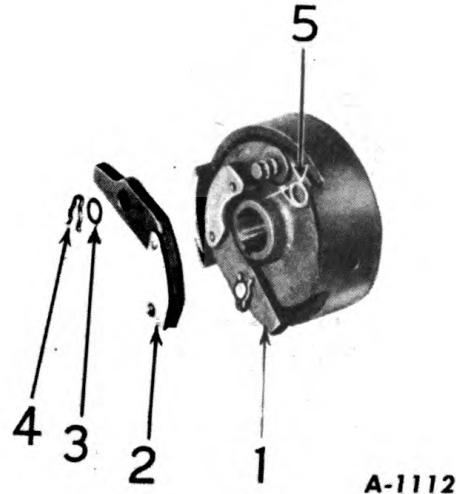
Apply a socket wrench to the nut and a wrench to one of the driving lugs (5) to prevent shearing the nail or pin while removing the nut.

The impulse coupling can now be removed with service tool SE-912 (4), *Illust. 5*, which screws into a thread provided inside the magneto member (6). As the tool is turned in, the inside end contacts the rotor shaft and forces the member off the shaft.

The impulse coupling drive member (6) with impulse coupling spring (1) can readily be removed as shown in *Illust. 6*. The impulse coupling spring (1) should seldom need to be removed from the driving member, but should it be necessary to remove the spring it can readily be pried out of place.

To replace this spring, just compress it sufficiently to fit into the drive member as shown. Before assembling the impulse coupling member (6) with the magneto member (7), soak the wick inside the impulse coupling spring with a PL or PS oil. Also coat inside hub (5) of the driving member with magneto grease (WB-2). The lug (3) should be a tight fit between the hardened button (2) on each end of the impulse coupling spring. If the buttons (2) should become worn or grooved, renew them.

The impulse pawl (1), *Illust. 7*, can be taken off after removing the retaining snap ring (4) and washer (3). The impulse pawl springs (5) can then be replaced. Use a small amount of (WB-2) grease on the pawl pivot and replace the springs, pawls, washers, and snap



A-1112

Illust. 7

Impulse Coupling Complete, Showing Rear Side of Magneto Member with Impulse Pawl Removed. 1. Impulse pawl; 2. Counterweight; 3. Washer; 4. Retaining snap ring; 5. Impulse pawl spring.

rings. The pawls should move freely on their pivots.

When replacing drive member (6), *Illust. 6*, be sure lug (3) of magneto member (7) fits between spring buttons (2).

Place a small amount of (WB-2) grease on the pawl pin (7), *Illust. 24* when replacing.

Press the assembled impulse coupling on the rotor shaft. Make sure that the keyway in the magneto member (7), *Illust. 6*, engages the key in the magneto rotor shaft.

Replace the washer (3), *Illust. 5*, and lock washer (2) which fits in one position only. Tighten impulse nut (1) the same way it was removed.

REPAIR SECTION

ELECTRICAL SYSTEM - Continued

Distributor Cap

The lead wire from the secondary coil (E), *Illust. 8*, plugs into the central insert socket and the cables to the spark plugs fit in the outside sockets, starting with No. 1, marked on the face of the cap. Pull out the cables and secondary wire from the distributor cap.

To remove the distributor cap, push the distributor cap springs out of the cap recesses and pull off the cap which fits only one way.

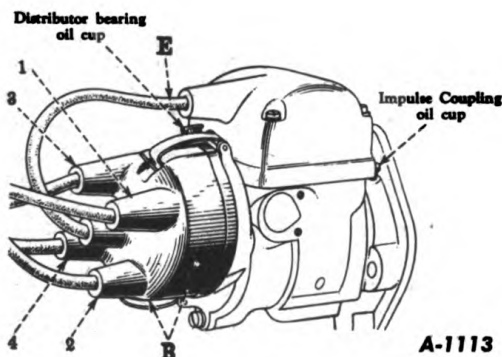
All grease should be removed from the monel strip on the distributor rotor to assure good contact.

The distributor cap should be free from dust or dirt, inside and out, before assembling to the magneto. The two ventilating holes (B), *Illust. 8*, should be open at all times.

Check thoroughly for cracks in the bakelite around the spark cable and secondary insert sockets. Very small cracks will allow a spark to go through the cap and partially short-out the engine.

For adjustment of the distributor rotor arm with respect to the inserts (3), *Illust. 9*, refer to *Illusts. 10 and 11* and the text on the distributor rotor.

The cap fits only one way; the ventilating holes (B), *Illust. 8*, are always on the bottom side. Snap the body springs into the distributor cap recesses, replace the secondary wire and connect up the spark cables.

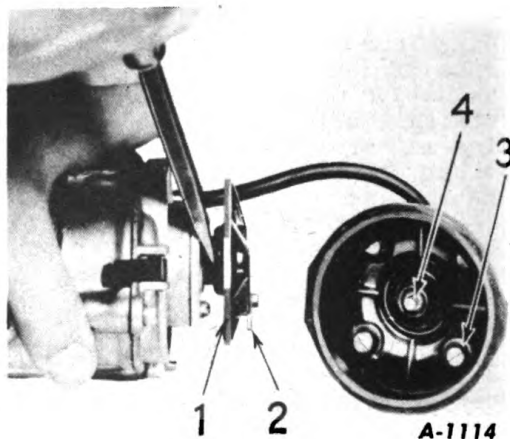


Illust. 8

Order of Connecting Spark Plug Wires in the Sockets of the Distributor Cap on the Counter-clockwise rotation.

The carbon brush (4), *Illust. 9*, in the central socket contacts the monel metal strip (2) of the distributor rotor (1). The brush, which is attached to a spring, should move freely in the socket. The brush (4) and spring can be pulled out of the socket if replacement is necessary.

If the four inserts (3) are badly worn, the cap should be replaced.



Illust. 9

Method of Removing Distributor Rotor from its Spindle. 1. Distributor rotor; 2. Monel distributor arm; 3. Distributor cap inserts; 4. Secondary carbon brush.

ELECTRICAL SYSTEM - Continued

Distributor Rotor

In removing this part, first take off the distributor cap. Apply the end of a screwdriver against the hub of the rotor and pry off as shown in *Illust. 9*. The bakelite rotor is fragile and should be handled with care.

The monel metal arm (1), *Illust. 10*, on the distributor rotor is adjustable and renewable. It is removed by running out the arm nut (2).

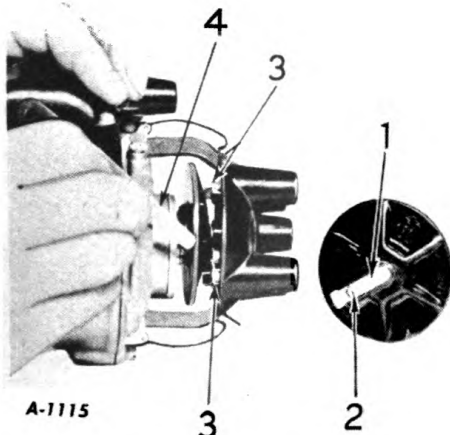
The arm (1) should operate as close to the insert in the distributor cap as possible without rubbing. (Refer to *Illusts. 10 and 11*.) To correctly adjust the distributor arm, a cap may be taken from stock and cut away as shown in *Illust. 10*. Then, by using a feeler gauge, the distance between the distributor arm and insert in the distributor cap can be checked. The arm can be adjusted slightly to gain the desired clearance.

Another method is to apply a little Prussian blue to the end of

the distributor arm, then place the distributor cap on the magneto. Next, turn the magneto rotor over several times by hand. If the limits between the distributor arm and caps are close, a small amount of bluing will be transferred to the distributor cap insert. A very slight coating should show on the insert without any actual rubbing occurring.

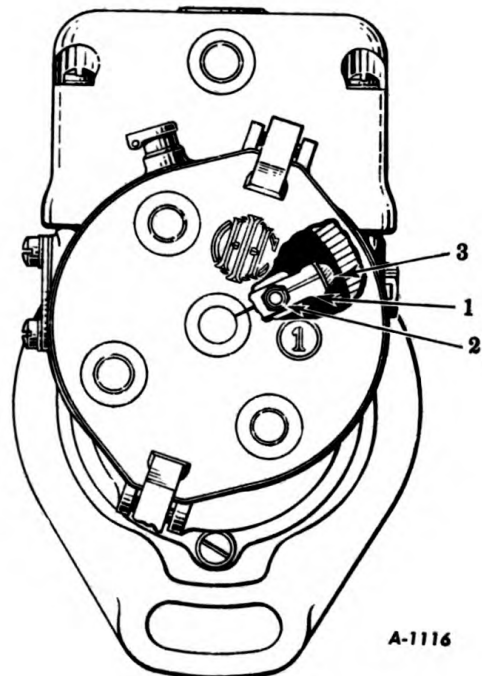
To adjust the rotor arm, loosen the nut (2), *Illust. 10*, and move the arm to the point where the outside end just clears the vertical portion of the distributor cap inserts (3).

When replacing the rotor, be sure that the key (1), *Illust. 12*, on the inside of the rotor (2) coincides with the slot (3) on the



Illust. 10

Checking Clearance between Distributor Rotor Metal Arm and the Insert in Distributor Cap Using a Cutaway Cap. 1. Monel metal arm; 2. Arm nut; 3. Distributor cap insert; 4. Feeler gauge.

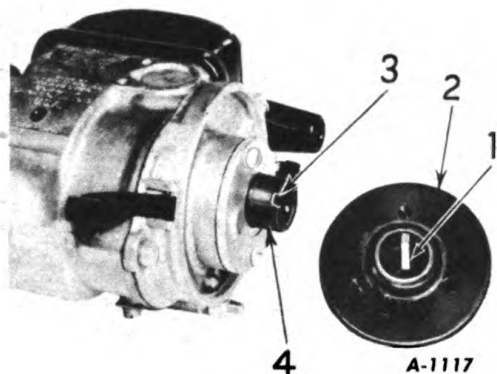


Illust. 11

Loosen nut (2) to adjust distributor rotor arm (1) as close to all four distributor cap inserts (3) as possible without actually rubbing.

ELECTRICAL SYSTEM - Continued

Distributor Rotor - Continued



Illustr. 12

Distributor Rotor Removed Showing Key and Keyway for Locking in Position. 1. Rotor key; 2. Rotor; 3. Distributor spindle keyway; 4. Distributor spindle.

end of the distributor gear spindle (4). To assist in lining up the key with the slot, use the rib which is opposite the monel metal arm on the opposite side of the rotor as a guide, the rib being in line with the key. Be sure that the rotor is pressed on as far as it will go because there is a possibility of entrapped air preventing the rotor from being pushed all the way down on the hub of the distributor gear. The rotor should have a heavy hand-press fit on the distributor spindle.

Replace the distributor cap, spark plug cables, and secondary cable.

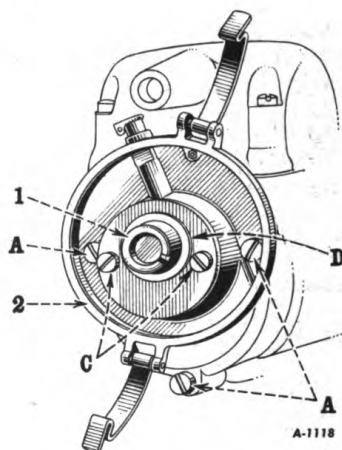
Distributor Body Removal and Replacement

The distributor body is removed to make the breaker points accessible. This can be done by removing the three cap screws "A", *Illustr. 13*, and lifting the complete body (2) from the magneto frame.

After servicing the breaker points, be careful that the flat spot on the rotor shaft (6), *Il-*

lust. 14, lines up with the flat spot on the pinion hub (5) in the distributor body (4). Also be sure to withdraw the spring anchor block (1) slightly so that the pad (2) will push it into place when the body (4) is reassembled to the magneto frame.

Secure the body (4), *Illustr. 14*, with the gasket, to the magneto frame with the three cap screws and lock washers when reassembling. The body and gasket fit in one position only.



Illustr. 13

Magneto with Distributor Cap and Rotor Removed. 1. Rotor spindle; 2. Distributor body.

Disassembly and Reassembly

The distributor gears are contained in a chamber which is a part of the distributor body (2), *Illustr. 13*. This chamber is partially filled with (WB-2) grease and sealed with felt washers around the hub of the gears. These seals and the consistency of the grease should prevent any possibility of the grease working out of the chamber.

By removing two screws (C), the cover (2), *Illustr. 15*, and gasket come off.

The distributor pinion (5), and the distributor spindle (9) can be lifted out.

ELECTRICAL SYSTEM - Continued

Disassembly and Reassembly
Continued

The felt oil seal (3) in the distributor body, *Illust. 14*, may be replaced by driving out the old retainer. Before replacing the retainer and felt, clean out the hole with a metal cutting tool such as a bearing scraping tool. Replace the felt and retainer and lock the new retainer in place by very lightly crimping over the edge of the body with a center punch. The thrust surface of the retainer should be flat. Do not soak the new seal in oil. After assembly, coat it lightly with magne-to grease.

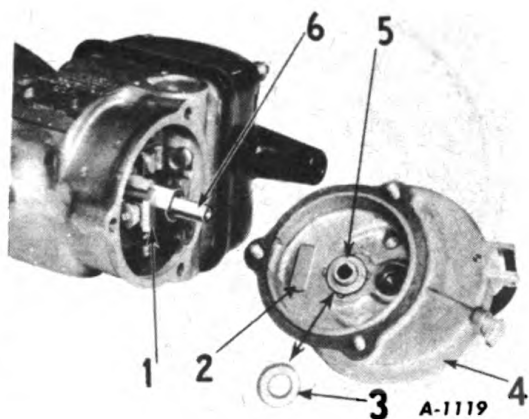
Replace the distributor gear spindle (9), *Illust. 15*, on the shaft (7). It should turn freely on the shaft.

Replace the pinion (5), *Illust. 15*, and check the backlash with the gear (6). A slight movement should be felt (approximately .002 inch to .004 inch).

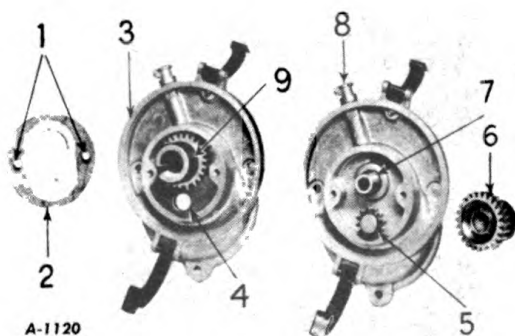
Take off the distributor spindle (9) and fill the bore with magne-to grease. Press the distributor gear spindle onto the shaft (7). As the teeth come in contact, time the distributor spindle by meshing the rotor pinion (5) and the distributor gear so that the marked tooth on the pinion (5) is in line with the "L" marking (a counter-clockwise magne-to) on the gear as shown in *Illust. 16*. This is a very important operation.

Partially fill the remaining chamber with (WB-2) grease. Replace the cover (2) with the gasket and secure with two screws. The distributor body can now be replaced as previously outlined.

Replace the distributor rotor as directed under that section and secure the distributor cap. Refer to the "Operations Section" for timing where the gear housing is removed while the magne-to is on the engine.

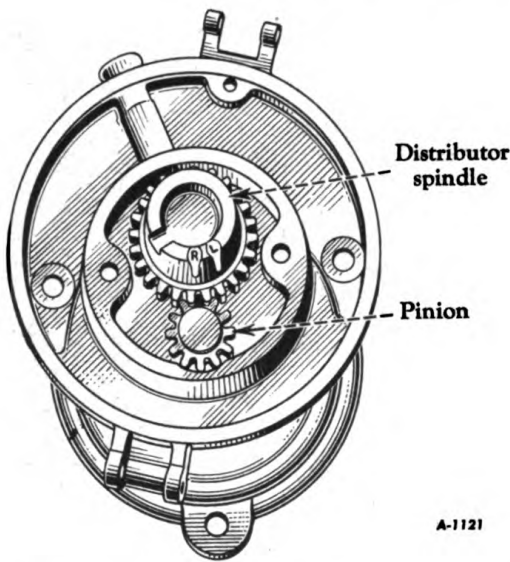


Illust. 14
Magneto with Distributor Body Removed. 1. Spring anchor block; 2. Distributor pad; 3. Distributor pinion oil seal; 4. Distributor body; 5. Distributor pinion hub; 6. Flat on end of rotor shaft.



Illust. 15
Distributor Gear Assembly. 1. Cap screws (2) in cover; 2. Gear chamber cover; 3. Gear body; 4. Bore for distributor pinion shaft; 5. Distributor pinion; 6. Distributor gear; 7. Distributor shaft; 8. Distributor bearing oil cup; 9. Distributor spindle.

ELECTRICAL SYSTEM - Continued



Illustr. 16

Timing Marks on Magneto Distributor Spindle and Pinion. "L"--Counter-clockwise Magneto.

Breaker Points

The entire breaker mechanism for the magneto is in its own separate, internal compartment, thoroughly sealed against dirt and moisture. This makes it possible to thoroughly grease the mechanism without grit working into the lubricant causing an abrasive action on working parts.

Remove the distributor cap, distributor rotor, (1), *Illustr. 9*, and the distributor body (4), *Illustr. 14*.

Now the breaker arm assembly (6) and spring anchor block (5), *Illustr. 17*, can readily be inspected and removed for any reworking required.

The spring anchor block (5) can be removed by unscrewing the nut that secures it to the breaker arm and primary leadout wire spring anchor terminal (2), *Illustr. 21*.

The stationary point (1), *Illustr. 17*, can be removed by running out one screw.

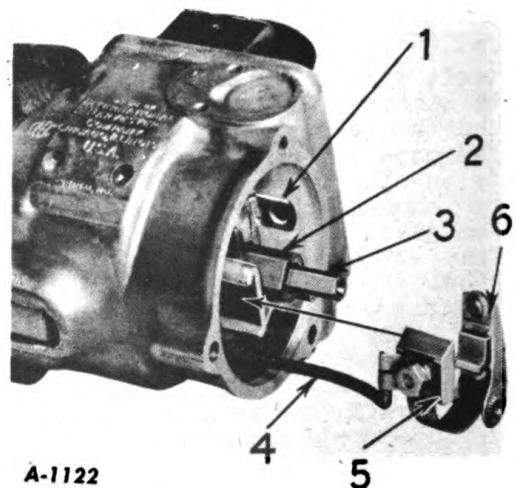
If the rubbing block (2), *Illustr. 18*, is worn, use a new breaker arm (3).

To replace the primary wire in the magneto frame, see instructions under that heading following.

Examine the inside of the breaker housing for oiliness or grease. If oil has been leaking into the breaker housing, the grease being used in the distributor gear case is too thin.

Another possibility is that excessive lubricant is being injected into the distributor gear oil cup, or that the felt seal (3), *Illustr. 14*, is not functioning properly. The replacement of the felt seal is covered under the "Distributor Body" heading.

Remember that a dirty or oily breaker chamber means excessive breaker point wear. Keep the breaker chamber clean at all times.



A-1122

Illustr. 17

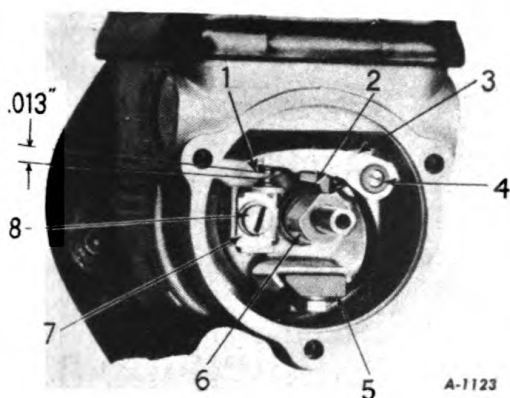
Magneto with Breaker Arm Removed. 1. Stationary point; 2. Breaker cam; 3. "D" shaped end of rotor shaft; 4. Primary lead-out wire; 5. Spring anchor block; 6. Breaker arm assembly.

ELECTRICAL SYSTEM - Continued

Breaker Points - Continued

Before reassembling, thoroughly clean all parts to remove dirt and grease.

Apply a light coating of (WB-2) grease to the breaker cam to prevent rusting.



Illustr. 18

End View of Breaker Mechanism. 1. Point opening; 2. Rubbing block; 3. Breaker assembly; 4. Breaker arm pivot recess (fill with magneto grease). 5. Spring anchor block; 6. Breaker cam; 7. Stationary point; 8. Adjusting screw.

Reinstall the fixed breaker point (7), *Illustr. 18*, leaving the screw (8) slightly loose until the point opening is adjusted.

Secure the anchor block and spring anchor terminal (2), *Illustr. 21*, to the breaker arm when assembling the breaker arm to the magneto. Do not flatten the spring terminal (2) and be careful that it does not touch any part of the magneto frame.

When reinstalling the anchor block (5), *Illustr. 18*, do not push it tight against the magneto body frame, but allow it to stick out far enough so that it is pushed into place by the distributor pad (2) onto the distributor body (4), *Illustr. 14*. For proper adjustment and timing see the "Operations Section".

Replace the body gasket and body and secure it with three screws as outlined under the "Distributor Body" heading.

Replace the distributor rotor and distributor cap.

Breaker Arm Cam

The breaker arm cam (2), *Illustr. 17*, should last indefinitely if it is properly lubricated. If the cam should become worn, it is designed so that it can be replaced. The cam is a press fit on the shaft and fits in only one way.

Condenser

To remove the condenser (3), *Illustrs. 19 and 20*, with the coil in place, bend lock (7) away from the flat on the condenser terminal screw (8). The screw can then be removed with the lock and outer bakelite washer (6).

Remove the coil cover; run out four screws.

Remove screw (2) which holds the condenser clamp.

Remove the flat plate (11) which is held by two screws. Push the condenser back into the frame and remove the inner washer (5) and two primary wires (9), from the condenser terminal. The primary wire from the breaker arm to the condenser is shown in *Illustr. 21*, Item (1).

Push the condenser out through the hole in the side of the magneto.

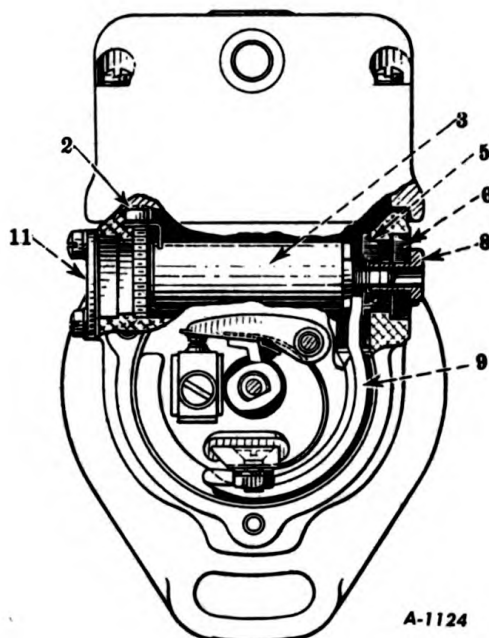
The condenser can be tested with the conventional equipment. Neon condenser tester set for 200 volts will give a satisfactory test.

Replace the inner bakelite washer (5), *Illustr. 19*, first.

Line up the terminals of the primary wires and insert the condenser.

ELECTRICAL SYSTEM - Continued

Condenser - Continued



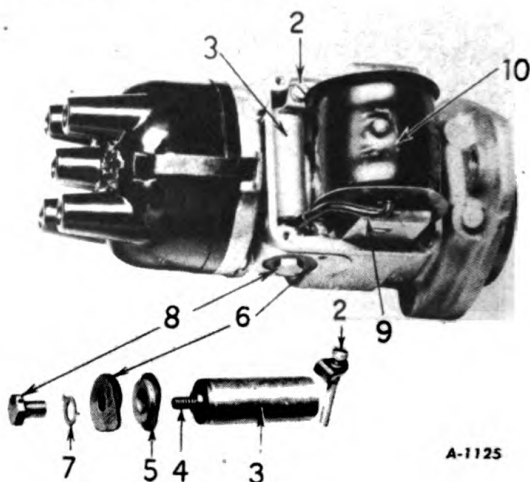
Illustr. 19

Cross Section View of Condenser Assembly. 2. Condenser clamp and screw; 3. Condenser; 5. Inner bakelite washer; 6. Outer bakelite washer; 8. Terminal screw; 9. Condenser primary wire; 11. Condenser hole cover plate.

Replace the outer bakelite washer (6) and secure the condenser (3) in position with a nut lock and terminal screw (8). When tightening the condenser terminal (8) there is a possibility of breaking the bakelite washer (6) or breaking the condenser terminal (4). Do not apply too much pressure to the wrench when tightening the screw.

Secure the condenser clamp and screw (2).

Secure the condenser hole plate and gasket (11) with cap screws and washers.



Illustr. 20

Magneto with Coil Cover Removed Showing Parts Making Up the condenser Assembly. 2. Condenser clamp and screw; 3. Condenser; 4. Condenser terminal; 5. Inner bakelite washer; 6. Outer bakelite washer; 7. Condenser terminal lock; 8. Terminal screw; 9. Primary lead-out wire; 10. Coil.

Replace the coil cover and gasket and secure them with four screws.

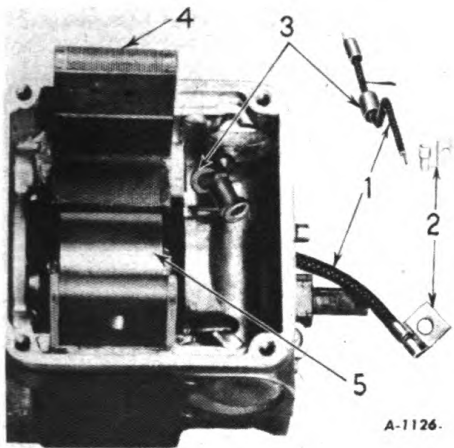
Primary Wire

The primary wire (1), *Illustr. 21*, connecting the breaker-arm assembly to the condenser terminal should be a tight fit in the rubber grommet (3). This grommet should be a tight fit in the magneto frame. The primary wire and the grommet should make an airtight job in the magneto frame.

To remove the primary wire (1), the spring anchor terminal (2) must first be unsoldered (assuming the coil cover, distributor cap, rotor and body are removed). Then pull the terminal wire out from the top of the magneto. In re-assembling the primary wires, reverse the above procedure. The primary wires to both the coil and condenser should be pulled tightly when the condenser is assembled.

ELECTRICAL SYSTEM - Continued

Primary Wire - Continued



Illustr. 21

Location and Assembly of Primary Wire. 1. Primary wire; 2. Spring anchor terminal; 3. Rubber grommet; 4. Coil inter pole; 5. Rotor magnet bridging air gap.

Coil and Coil Cover

The coils are marked as to the month and year of their manufacture. For instance, a mark 1-42, means that the coil was built in January, 1942.

Remove the coil cover and gasket by taking out four screws. Screws will be retained in the cover if they are unscrewed only from the magneto frame.

Remove the primary lead-out wire (9), *Illustr. 20*, from the condenser terminal by following the same procedure as outlined for removing the condenser.

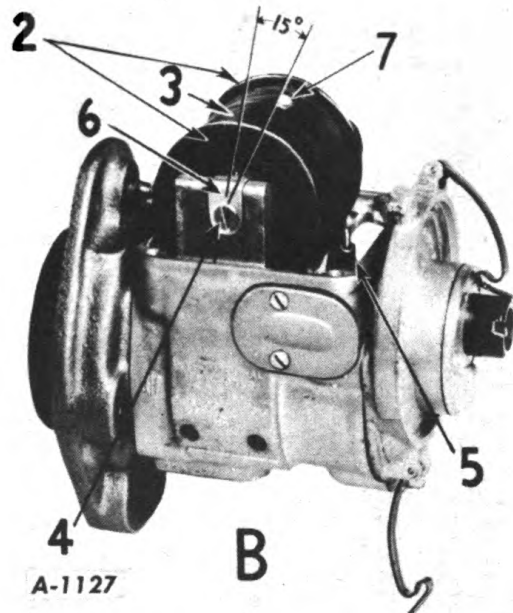
Illustr. 22 shows the magneto with the coil cover removed; it shows the coil strip (6) attached under the countersunk screw (4). Remove the two screws (4) from each end of the coil core. The coil may then be taken out.

Important: Before lifting the coil out, turn the magnet to the neutral position or so the pole of the magnet bridges the air gap between the end of the coil pole

pieces as shown with arrow (5), *Illustr. 21*.

The coil can be tested with conventional equipment.

Inspect the end insulators (2), *Illustr. 22*, of the coil. If they are damaged they should be renewed.



Illustr. 22

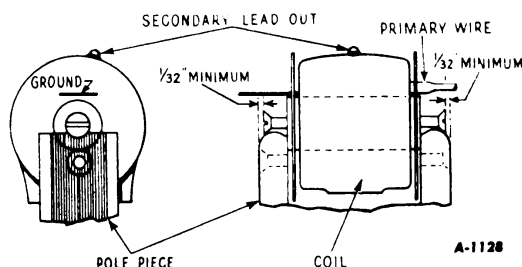
Coil Mounting in Magneto. 2. Coil insulators; 3. Coil; 4. Coil core holding screw, countersunk; 5. Condenser to breaker wire; 6. Coil grounding strip; 7. Secondary lead-out terminal.

Test the length of the coil-core mounting screw (4) by bottoming the screws lightly in the coil core and pressing the assembly into position as shown in *Illustr. 23*. The mounting screws are 5/8 inch long. If either screw head does not fall back of the face of the pole piece by 1/32 inch as shown, it must be removed and enough cut off the threaded end to meet this requirement. When the coil core is in place, the screws will then tighten up in the countersunk hole of the pole piece before the screws bottom in the coil core.

ELECTRICAL SYSTEM - Continued

Coil and Coil Cover - Continued

Caution: Do not file or otherwise deface the ends of the coil core or the face of the pole pieces as this will impair the magnetic circuit and efficiency of the magneto. The coil core should be a tight hand-press fit between the pole pieces.



Illust. 23

Assemble Coil Core Mounting Screws to Coil Core to make sure they do not bottom in core when assembled in Magneto.

Press the coil in place first when replacing. The secondary lead-out terminal (7), *Illust. 22*, should be at an angle of 15° with the center line of the coil. The reason for so positioning the coil terminal is to secure a good contact with the secondary terminal outlet in the coil cover. Secure the coil-core holding screws (4) tightly in position.

Replace the condenser as outlined under that subject, being sure to attach the primary-coil lead-out to the condenser terminal.

Before replacing the coil cover, make sure that the contact points are clean and that the secondary lead-out in the coil cover bears firmly against the secondary lead-out terminal (7), *Illust. 22*. Replace the coil cover and gasket and secure it to the magneto frame with four screws.

Mounting Flange

Remove the impulse coupling as directed under that subject.

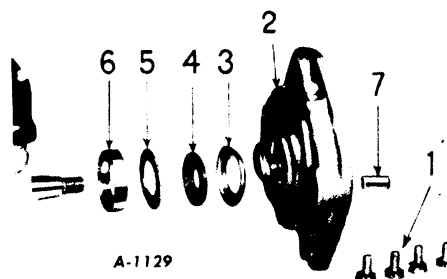
The mounting flange (2), *Illust. 24*, is attached to the magneto bracket and is held to the magneto frame with four countersunk screws and Shakeproof lock washer (1). The flange is freed by taking out these four screws.

If replacement is desired, the leather oil seal can be pushed out of the mounting flange. The outer bearing race (6) must be removed first. Place the outer retainer (3) in position with the internal taper side of the leather seal (4) facing the bearing race; the bulged side of the oil seal faces the retainer (3). Then replace the inner retainer (5) and press the bearing race (6) in position. Assemble the mounting flange to the magneto body and check the rotor shaft for end play as outlined under "Rotor".

After the proper adjustments have been made as directed above, replace the flange and secure with four Shakeproof lock washers and countersunk screws.

Replace the impulse coupling.

See "Bearing Race and Oil Seals" heading.



Illust. 24

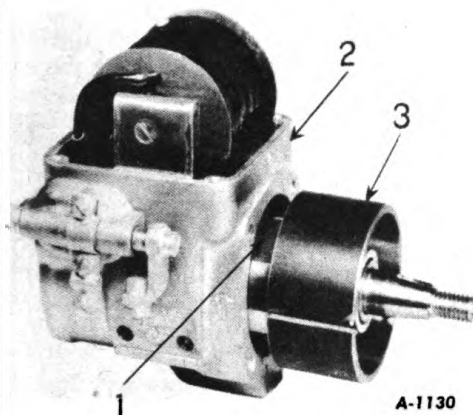
Magneto with Impulse Coupling Removed, showing Mounting Flange and Rotor Bearing Parts. 1. Countersunk screws with lock washers; 2. Mounting flange; 3. Outer oil seal retainer; 4. Leather oil seal; 5. Inner oil seal retainer; 6. Outer bearing race; 7. Pawl pin.

ELECTRICAL SYSTEM - Continued

Rotor

A feature of the magneto is the combination of the rotor and the magnet which means that the magnet is the revolving part of the magneto.

To remove the rotor and bearings, it is necessary to remove the impulse coupling and mounting flange as outlined under those subjects.



Illustr. 25

Removing Magneto Rotor. Remove rotor (1) from magneto frame (2). Slide Keeper No. 57314D (3) over rotor poles before rotor is completely out of frame.

Then slide the rotor magnet into a keeper (3), *Illustr. 25*, as it is being removed from the magneto frame. Always have the rotor in the keeper when it is out of the magneto frame. Use extreme care to see that the rotor does not pick up dirt and metal particles. The keeper is available as a service part.

The bearing outer races (6), *Illustr. 24*, can be removed and replaced with service tools as outlined under "Mounting Flange," and as shown in *Illustr. 29*. Refer also to the heading "Bearing Race and Oil Seals."

The inner bearing race can be readily removed from the rotor by using a puller and adapter as shown in *Illustr. 27*. It is necessary to remove the inner bearing race when removing or inserting rotor shims (2), *Illustr. 26*, for preloading the rotor bearings.

When the bearing inner race (4) has been removed, the inner oil flinger (3) and the rotor shims are free.

Before reassembling, first read the first four paragraphs following the "Important" note below.

Thoroughly clean rotor and bearing parts and reassemble to the rotor approximately the same thickness of shims as was taken out. The distributor body assembly (4), *Illustr. 14*, should be removed to facilitate correct adjustment of the rotor.

Replace the inner oil flinger (3), *Illustr. 26*, with the upset portion toward the rotor magnet.

Press the bearing inner race (4) firmly in place and replace the bearing retainer with balls (5).

The oil seals in the magneto frame and mounting flange can be replaced as directed under "Mounting Flange" and "Bearing Races and Oil Seals."

Important: The next instructions must now be followed carefully and completely for efficient operation of the magneto.

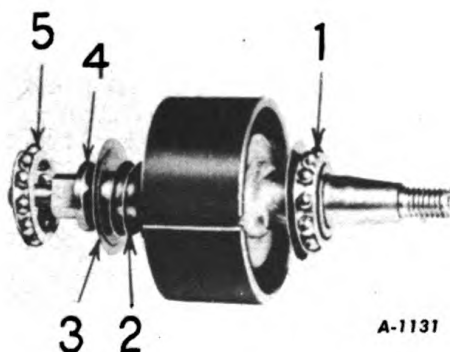
Thoroughly clean the rotor assembly and bearing races of the old grease and any grit. Regreasing of the bearings should not be done until they have been checked for end play.

The bearings, when assembled at the factory, are preloaded .001 inch to .002 inch. The rotor should never have any perceptible end play after it is assembled properly.

ELECTRICAL SYSTEM - Continued

Rotor - Continued

Old bearings and races should be assembled without disturbing shims (2), *Illust. 26*. Should an end play check (*Illust. 28*) reveal that end play is present, no attempt should be made to preload old bearings as this will cause rapid deterioration of the bearings. The recommended procedure when end play exists on old bearings is to replace them.



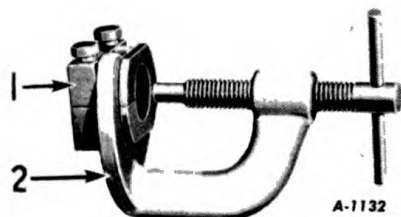
A-1131

Illust. 26

Rotor Magnet with Keeper, Bearings, and Shims. 1. Forward bearing; 2. Rotor shims; 3. Inner oil flinger; 4. Bearing inner race; 5. Bearing retainer with balls.

The distributor body assembly (4), *Illust. 14*, should be removed to facilitate correct adjustment of the magneto rotor.

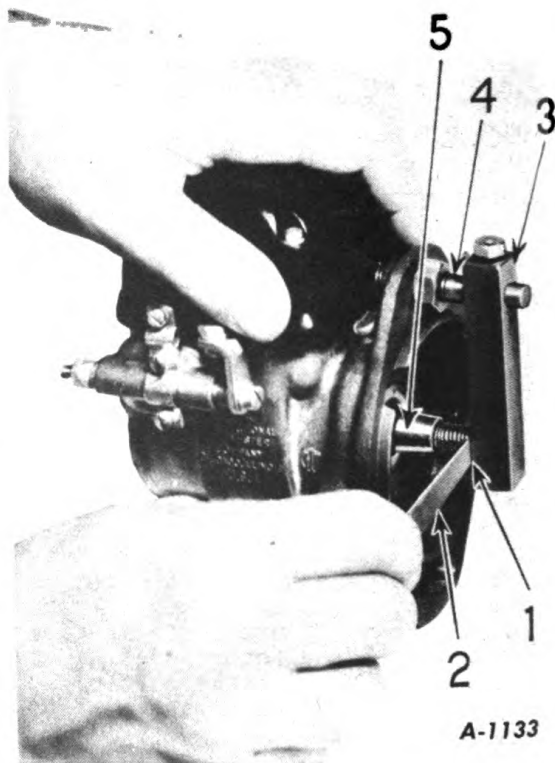
Place sufficient shims (2), *Illust. 26*, in back of the new bearing race to allow a small amount of end play in the rotor shaft after it is completely assembled with the mounting flange in place and the mounting screws (1), *Illust. 24*, tightened up (end play should be checked with no grease on the bearings). The end play may then be checked with a dial indicator or by making a device as shown in *Illust. 28*. Then check the end play between the fixture (3), and the end (1) of the rotor shaft (5) with a feeler gauge (2).



A-1132

Illust. 27

Inner Race Puller Tool SE-839. 1. Bearing race adapter; 2. Puller.



A-1133

Illust. 28

Checking Rotor End Play. 1. Checking position; 2. Feeler gauge; 3. Fixture end piece; 4. Fixture mounting bolt; 5. Rotor shaft.

ELECTRICAL SYSTEM - Continued**Rotor - Continued**

Take two readings of the feeler gauge, one with the rotor as far one way as it will go, and the other with the rotor moved as far in the opposite direction as it will go. The difference in these two readings will be the actual end play. Add .001 inch to the difference between the two readings, which should be the thickness of the additional shims to be added.

Remove the mounting flange, slide the rotor into the keeper, pull the race from the shaft and then add the required number of shims (2), *Illust. 26*, in the proper location. Grease bearings, re-assemble the rotor and the mounting flange, and check the rotor for free turning. Be careful not to overfill the bearings with grease; just fill the spaces between the balls of the bearings with magneto grease. The preloading of the bearing should not cause binding of the rotor.

Important: Be sure to keep the rotor and bearings clean during this operation. Do not drop the magnet or hit it with any sharp instrument, because it is very brittle and will chip readily.

Extreme care must be exercised to assure that the rotor is free from metal chips before it is assembled into the magneto, as chips may jam the rotor. The magnet is highly magnetized and will draw all magnetic metals to it. Using compressed air is one of the best methods to clean the rotor.

Replacement of the magneto rotor assembly and mounting flange is covered above.

Then replace the impulse coupling, distributor body, distributor rotor and distributor cap as directed under those subjects.

Magnet

As stated before, the magnet is part of the rotor and is the revolving member of the magneto. The magnet, made of a new alloy known as Alnico (an Aluminum, nickel, cobalt and iron alloy), is cast directly into sand moulds. After it is once thoroughly magnetized, this magnetic material should never lose its magnetism if carefully handled.

It cannot be stressed too emphatically the importance of being careful to guard against metal chips adhering to the magnet. The use of compressed air is one of the best methods of cleaning the magnet and rotor before assembly into the main frame of the magneto. The clearance of the magnet and the pole pieces of the magneto is so close that any chips adhering to the magnet may cause the rotor to become jammed.

Bearing Outer Race and Oil Seals

The front bearing outer race and oil seal are assembled in the mounting flange (2), *Illust. 24*; they are accessible after removing the impulse coupling and mounting flange as directed under those subjects. The purpose of the oil seals is to keep lubricating oil out of the magneto body.

The rear bearing outer race and oil seal are assembled in the main frame. The magneto rotor, distributor cap, distributor rotor, and distributor body assembly as well as the above mentioned must be removed.

The rotor shaft leather seal (4), *Illust. 24*, and the two retaining members (3) and (5) are held in place by the press fit of the rotor ball-bearing outer race (6). The rotor bearing races (6) can be removed with a puller, item (1), *Illust. 29*. Races may be replaced with a tool, such as item (2).

ELECTRICAL SYSTEM - Continued

Bearing Outer Race and Oil Seals - Continued

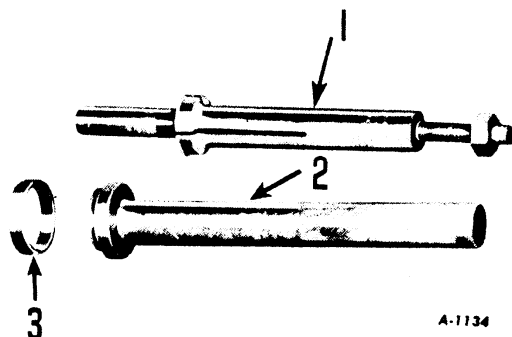
The magneto outer bearing race in both the housing and magneto mounting flange can be readily removed. Loosen the expander and insert the tool into the bearing race. Manipulate the split sleeve flange through the bearing race and hold it against the felt retainer. Now draw up on the expander by applying a wrench to flats on the threaded end of the expander and turning in a counter-clockwise direction until a definite pressure is felt. Then tighten the hexagon nut, and carefully drive the bearing race from place.

Illust. 24 shows the sequence of assembly of the bearing race and oil seal. The internal taper side of the leather oil seal (4) faces the bearing race (6), and the bulged side of the oil seal retainer (5) faces the oil seal (4). Careful centering and proper arrangement of the oil seal produces maximum compression and efficiency.

Before replacing the outer bearing races, make sure the felts and retainers are correctly assembled in place. Set the bearing race on the end of the tool (2), *Illust. 29*. A small amount of clean grease will hold the

race on the tool. Carefully line up the tool over the hole and drive the race in place.

If a new bearing race has been installed, the recommended procedure is to remove the complete rotor and bearings and reassemble all parts as covered under "*Rotor*" (including checking magneto rotor shaft end play).



Illust. 29
Tools Used for Removing and Replacing Magneto Outer Bearing Races. 1. Magneto bearing race puller tool SE-1020; 2. Magneto bearing race replacer tool SE-1021; 3. Outer bearing race.

Generator and Relay

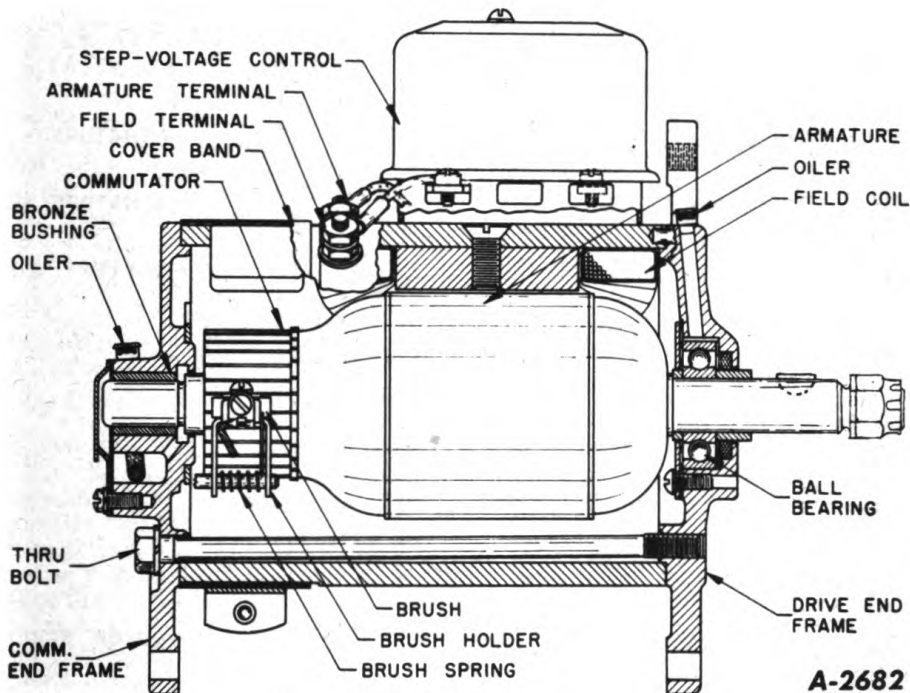
Generator Specifications

Rotation - clockwise, viewing drive end.
Brush spring tension - 16 ounces.
Maximum cold output - 8-10 amperes at 14.4-14.9 volts at 2200 R.P.M.
Maximum hot output - 6-8 amperes at 14.1-14.5 volts at 2400 R.P.M.
Field current - 1.5 to 1.67 amperes at 12 volts.

Cut-Out Relay Specifications

Air gap - .015 inch with points closed.
Point opening - .020 inch.
Closing voltage - 13-13.8 volts.
Opening amperage - 0-3.0 amperes.

ELECTRICAL SYSTEM - Continued



Illustr. 30
Cross Section of Generator.

Generator and Relay

The Delco-Remy Model 1101725 Generator is a 12-volt, third brush unit with a ball bearing in the drive end and a bronze bearing in the commutator end. A Model 1116777 Cut-Out Relay is mounted on the generator frame.

Maintenance of the Generator

General maintenance may be divided into two sections, *normal maintenance* required to assure continued operation of the generator and the *checking and repair of inoperative generator*.

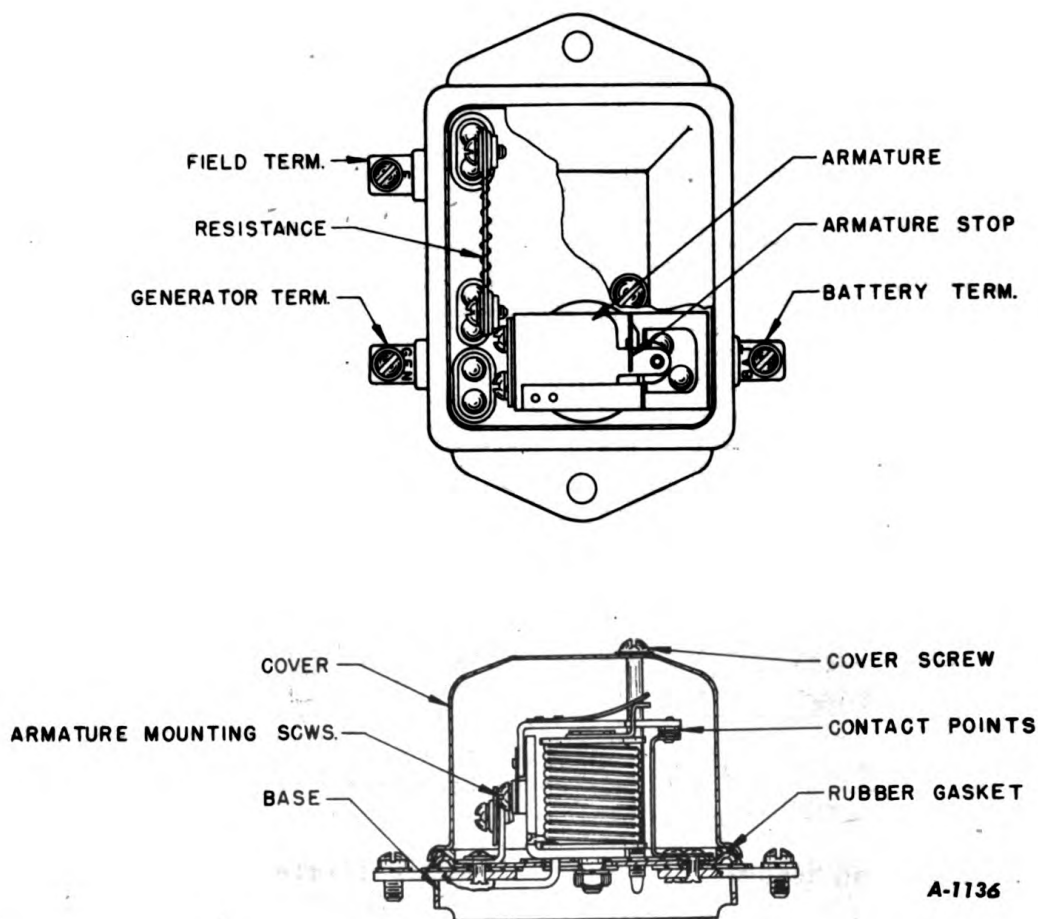
Normal Maintenance of the Generator

Inspection: The cover band should be removed and the commutator and brushes inspected at regular intervals. If the commutator is dirty, it may be cleaned with No. 00 sandpaper. Blow out dust. **NEVER USE ENERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is rough, out of round, or has high mica, it should be turned down in a lathe and the mica undercut.

Worn brushes should be replaced. They can be seated with a brush seating stone. The brush seating stone is an abrasive material which, held against the revolving commutator, carries under and seats the brushes in a few seconds. Blow out the dust. **NEVER USE ENERY CLOTH.**

REPAIR SECTION

ELECTRICAL SYSTEM - Continued



Illust. 31
Cross Section of Generator Cut-Out Relay.

Disassembly of the Generator

At the recommended intervals, the generator should be disassembled for a thorough cleaning and inspection of all parts. Never clean the armature or fields in any degreasing tank, or with grease dissolving materials, since these may damage the insulation. The ball bearing should be cleaned and repacked with the recommended lubricant. The commutator should be trued in a lathe and the mica undercut if necessary. All wiring and connections should be checked.

Rosin flux should be used in making all soldered connections. Acid flux must never be used on electrical connections.

Checking an Inoperative Generator

Several conditions may require removal of the generator from the engine and further checking of the generator, as follows:

1. No output.
2. Unsteady or low output.
3. Excessive output.
4. Noisy generator.

ELECTRICAL SYSTEM - Continued

Checking an Inoperative Generator - Continued**1. No Output.**

Remove cover band and check for sticking or worn brushes and burned commutator bars. Burned bars, with other bars fairly clean, indicate open circuited coils. If brushes are making good contact with commutator and commutator looks okay, use test leads and light and check as follows:

- a. Raise grounded brush, check with test points from "A" terminal to frame. Light should not light. If it does, the generator is grounded; raise other brush from commutator and check field, commutator and brush holder to locate ground.
- b. If generator is not grounded, check field for open circuit.
- c. If the field is not open, check for shorted field. Field draw at 12 volts should be 1.5 to 1.67 amperes. Excessive current draw indicates shorted field.
- d. If trouble has not yet been located, remove armature and check on growler for short circuit.

2. Unsteady or Low Output.

Check as follows:

- a. Check drive.
- b. Check brush spring tension and brushes for sticking.
- c. Inspect commutator or roughness, grease and dirt, dirt in slots, high mica, out of

round, burned bars. With any of these conditions, the commutator must be turned down in a lathe and mica undercut. In addition, with burned bars which indicate open circuit, the open circuit condition must be eliminated or the armature replaced.

3. Excessive Output.

Excessive output usually results from a grounded generator field - grounded either internally or externally. Opening the field circuit disconnecting lead from "F" terminal of generator with the generator operating at a medium speed will determine if the generator is at fault. If the output drops off, the field is grounded externally. If the output remains high, the field is grounded in the generator, either at the pole shoes, leads, or at the "F" terminals.

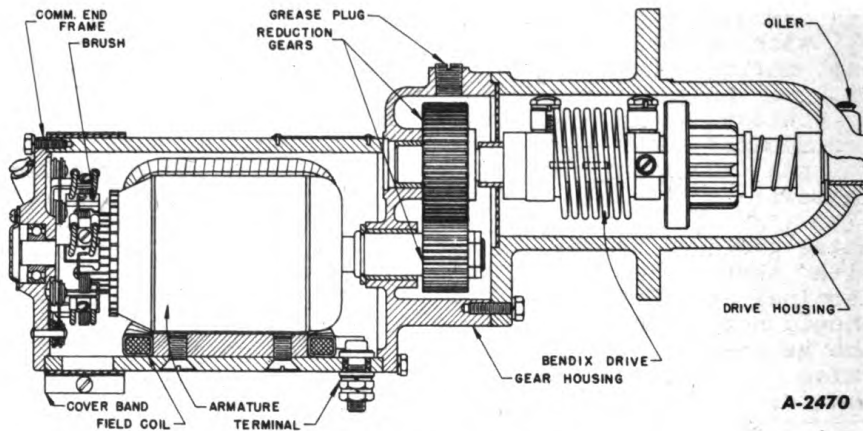
4. Noisy Generator

Noisy generator may be caused by loose mounting, drive unit, worn, dry or dirty bearings, or by improperly seated brushes. Brushes may be seated by using brush seating stone, referred to above.

Installation Caution: After the generator is reinstalled on the engine, or at any time after leads have been disconnected and then reconnected to the generator, a jumper lead should be connected MOMENTARILY between the BATTERY and GENERATOR terminals of the cut-out relay, *before starting the engine.* This allows a momentary surge of current from the battery to the generator which correctly polarizes the generator with respect to the battery it is to charge.

ELECTRICAL SYSTEM - Continued

Starting Motor



Illustr. 32
Cross Section of Starting Motor.

Starting Motor Specifications

Clockwise rotation viewing the pinion end.

Brush spring tension 2.25 to 2.50 lbs.

No load test 4500 R.P.M. - 80 amperes - 11.20 volts.

Lock torque. 32 ft.-lbs. - 670 amperes - 5.35 volts.

The Delco-Remy Model 710 Starting Motor is a heavy-duty, 12-volt gear-reduction unit. There is an annular ball bearing at the commutator end, a bronze center bearing, and a bronze bearing in the pinion housing. Lubrication is provided for each bearing by dust-proof, hinged-cap oilers. The Bendix drive, keyed to the drive shaft, automatically engages the cranking pinion with the flywheel ring gear when the armature begins to revolve. When the engine fires, the

over-running effect of the flywheel on the pinion disengages it from the flywheel.

Maintenance of the Starting Motor

Starting motor maintenance may be divided into two sections, *normal maintenance* required to assure continued operation of the motor and the *checking and repair* of an inoperative starting motor.

ELECTRICAL SYSTEM - Continued**Normal Maintenance of the Starting Motor**

Inspection: The cover band should be removed periodically and the brushes and commutator inspected. If the commutator is dirty, it may be cleaned with No. 00 sandpaper. **NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is rough, out of round, or has high mica, it should be turned down in a lathe and the mica undercut. The mica should be cut away to the depth of 1/32-inch. Worn brushes should be replaced. If brushes wear with excessive rapidity, check for excessive brush spring tension, roughness or high mica of the commutator.

Disassembly of the Starting Motor

At the recommended intervals, depending on the type of service, the starting motor should be disassembled for cleaning and inspection of all parts. The Bendix drive should be cleaned and oiled with a PS or PL oil, as any accumulation of dirt on the drive might restrict the free movement of the pinion. Never clean the armature and field coils in a degreasing tank, or with grease dissolving materials since these may damage the insulation. The commutator should be trued in a lathe and the mica undercut if necessary. Replace all parts shown excessive wear. All wiring and connections should

be checked. Roxin flux should be used in making soldered connections. Acid flux must never be used on electrical connections. Submit reassembled unit to NO LOAD and LOCK TORQUE TESTS.

Checking of Improperly Operating Starting Motor

If the starting motor does not develop rated torque and cranks the engine slowly or not at all, check the battery, battery terminals and connections and the battery cables. Corroded, frayed or broken cables should be replaced and loose or dirty connections corrected. The starting motor control switch should be checked for burning contacts and the switch contacts cleaned or the switch replaced if necessary. If all these are in order, remove the cover band of the starting motor and inspect the brushes and commutator. The brushes should form good contact with the correct brush spring tension. A dirty commutator can be cleaned with a strip of No. 00 sandpaper held against the commutator with a stick while the starting motor operates. **NEVER USE EMERY CLOTH TO CLEAN COMMUTATOR.** If the commutator is very dirty, or burned, or has high mica, remove the armature from the starting motor and take a cut off the commutator in a lathe. The mica should be undercut to a depth of 1/32-inch.

ELECTRICAL SYSTEM - Continued

Checking of Improperly Operating Starting Motor - Continued

If there are burned bars on the commutator, it may indicate open circuited armature coils which will prevent proper cranking. Inspect the soldered connections at the commutator riser bars. An open armature will show excessive arcing at the commutator bar which is open, on the no-load test.

Tight or dirty bearings will reduce armature speed or prevent the armature from turning. A worn bearing, bent shaft, or loose field pole screws will allow the armature to drag on the pole shoes, causing slow speed or failure of the armature to revolve. Check for these conditions.

If the brushes, brush spring tension and commutator appear in good condition, the battery and external circuit found satisfactory, and the starting motor still does not operate correctly, it will be necessary to remove the starting motor for no-load and torque checks.

No Load Test

Connect the starting motor in series with a battery of the specified voltage and an ammeter capable of reading several hundred amperes. If an R.P.M. indicator is available, read the armature R.P.M. in addition to the current draw.

Torque Test

It is advisable to use in the circuit a high current carrying variable resistance, so that the specified voltage at the motor can be obtained. A small variation of the voltage will produce a marked difference in the torque developed.

Interpreting results of No Load and Torque Tests

1. Rated torque, current draw and no load speed indicates normal condition of starting motor.
2. Low free speed and high current draw with low developed torque may result from:
 - a. Tight, dirty, or worn bearings, bent armature shaft or loose field pole screws which would allow the armature to drag.
 - b. Shorted armature. Check armature further on growler.
 - c. A grounded armature or field. Check by raising the grounded brushes and insulating them from the commutator with cardboard and then checking with a test lamp between the insulated terminal and the frame. If test lamp lights, raise other brushes from commutator and check fields and commutator separately to determine whether it is the fields or armature that is grounded.

ELECTRICAL SYSTEM - Continued**Interpreting results of No
Load and Torque Tests -
Continued**

3. Failure to operate with high current draw:
 - a. A direct ground in the switch, terminal or fields.
 - b. Frozen shaft bearings which prevent the armature from turning.
4. Failure to operate with no current draw:
 - a. Open field circuit. Inspect internal connections and trace circuit with a test lamp.
 - b. Open armature coils. Inspect the commutator for badly burned bars. Running free speed, an open armature will show excessive arcing at the commutator bar which is open.
 - c. Broken or weakened brush springs, worn brushes, high mica on the commutator, or other causes which would prevent good contact between the brushes and commutator. Any of these conditions will cause burned commutator bars.
5. Low no-load speed, with low current draw indicates:
 - a. An open field winding. Raise and insulate ungrounded brushes from commutator and check fields with test lamp.
 - b. High internal resistance due to poor connections, defective leads, dirty commutator and causes listed under 4.c. above.
6. High free speed with low developed torque and high current draw indicates shorted fields. There is no easy way to detect shorted fields, since the field resistance is already low. If shorted fields are suspected, replace the fields and check for improvement in performance.

REPAIR SECTION

MEMORANDA

ENGINE**Specifications**

Bore and Stroke, inches	4-3/4 x 6-1/2
Number of Cylinders	4
Type of Cylinders	Wet Sleeve
Displacement, Cu. In. Per Rev.	461
Governed R.P.M.	1350
Governed High Idle Speed, R.P.M.	1500
Governed Low Idle Speed, R.P.M.	425
Piston Speed, feet per minute @ 1350 R.P.M.	1462
Compression Pressure, lbs.	465
Compression Ratio	13.67 to 1
Fuel	Diesel Fuel

Air Cleaner

A Donaldson 9" oil-washed air cleaner with an oil cup is used on this tractor. The intake is provided with a screen to prevent large particles, such as chaff, leaves, etc. from entering the air cleaner. The air passes through the screen, down the center into the oil cup, and up through screens to the intake manifold. Reversal of air flow at the base separates dust from the air. Oil carried upward with air as a mist is separated from the air by crimped screen elements, returning oil to the base and washing the crimped screens.

The oil cup should be removed for periodical cleaning and refilling with fresh oil to the proper level. Screens should be washed with kerosene. Joints, rubber connections, etc., should be air tight to prevent entrance of dirt particles. Refer to the "Operations Section" for complete servicing of the air cleaner.

Proper functioning of the air cleaner is important to obtain maximum power from an engine. A restricted air cleaner will cause a loss of power.

Manifold

The intake manifold is of the dual type, consisting of two air passages. Only one of the passages is used during the starting operation -- the other is used for Diesel operation. The manifold includes two butterfly valves which close off the Diesel passage when starting the engine on gasoline. The magneto cut-out switch is located in a compartment at the front end of the manifold and is attached directly to the end of the butterfly valve shaft. It grounds the magneto after the engine is converted from gasoline to Diesel operation and breaks contact when the starting mechanism controls are set in the starting position.

The entire unit can be removed after disconnecting the fuel line to the carburetor; removing cotter keys and slipping out the primer control rod, the choke control rod, and the carburetor control link; disconnecting the magneto grounding wire from the front of the manifold; removing the nuts holding the manifold to the cylinder head; and removing the air-pipe from the air cleaner to the manifold.

REPAIR SECTION

ENGINE - Continued

Manifold - Continued

Replacement is the reverse of the above. Be sure gaskets are in good condition. Tighten manifold nuts to 75 ft.-lbs. torque.

When the entire unit is serviced, or parts replaced, refer to the "Starting System," Section 10.

Lubrication

Capacity, U.S. Quarts 16

Full-Pressure System. Yes

Oil Filter, Model P-20

Oil Pressure, Lbs. 60

Oil Pressure

Valve. In Purolator Base

Full force-feed lubricates the crankshaft bearings, camshaft bearings, connecting rod bearings, piston pins, valve mechanism, and timing gears.

Oil Pressure

Oil pressure is controlled by a plunger-type regulating valve located in the Purolator base, set at 60 lbs. pressure. The oil regulating spring should test 38.2 lbs. at 2-3/32" while the free length is 3-39/64".

The pressure valve O.D. is .900" to .901" and the bore in the Purolator base is .905" to .906", or the clearance for the valve is .004" to .006". Be sure the valve slides freely and the spring does not cock the valve in the bore, seating improperly.

Valve springs take a set after continued use - hence their free length may be somewhat shorter than dimensions listed. The best way to check these springs is to load them with weight specified and to measure their length at this load. This load is equivalent to the conditions existing when the valve spring is in the operat-

ing position. Valve springs falling below this standard should be replaced.

Oil Filters

Two Motor Improvement P-20, paper renewable type, lubricating oil filters are accessibly located on the right side of the engine. A quantity of oil is bypassed from the main circulatory system, through the cleaning element to the crankcase.

Filter elements should be renewed every time oil is changed, or oftener if need be. Be sure the end of the element marked "Top" is toward the top of the filter case.

Circulation

The path of lubricating oil is from the sump and through a "Float-o" oil screen from where it is pumped under pressure to the Purolator filter base. From the base, a passage leads to the filters and is known as the bypass. A portion of the oil is bypassed through the filters, the amount depending upon the cleanliness of the filter elements. The valve in the Purolator base maintains the proper pressure on all bearings and at the same time protects the system and pump mechanism when thick oils caused by severe weather conditions build up high pressures in the oil lines. The oil passed through the filter is returned to the sump as is the oil that is bypassed by the pressure relief valve. Oil under pressure, however, is discharged from the filter base into the rifle-drilled passages in the crankcase from where it is directed to the main bearings.

Oil from the main bearings passes through drilled passages in the crankshaft to the connecting-rod bearings, then through drilled passages in the connecting rods to the piston pins.

Oil passages also lead to the camshaft bearings, and timing gears. Another passage leads from the

ENGINE - Continued

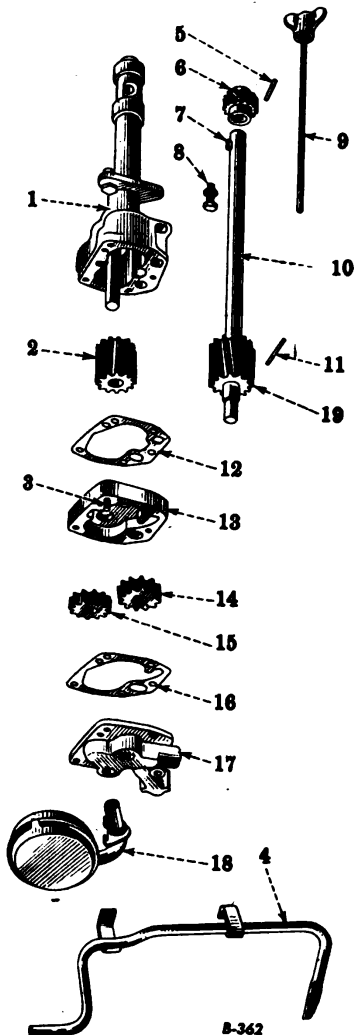
Circulation - Continued

front camshaft bearing and extends upward through the crankcase to the valve rocker mechanism. A slot in the bearing journal allows a small amount of oil to flow to the rocker arms with each revolution of the camshaft. The valve lever shaft is hollow and distributes oil to valve rockers and valve stems. The oil is drained back to the sump through the valve push-rod holes in the crankcase and in so doing lubricates valve tappets and cams. A valve oiler pad over the

valve levers is kept saturated with oil from drilled holes in the top of the valve lever.

Oil Pump

The double-gear type oil pump has two gears on the pump drive shaft and two gears on the idler shaft. The upper main set of gears supplies oil to the lubricating system; the auxiliary set of gears pumps oil from the shallow end of the oil pan back to the sump when the unit is operating downgrade.



Illustr. 1 -
Exploded View of the
Lubricating Oil Pump.

Ref. No.	Description
1	Body.
2	Idler gear.
3	Dowel.
4	Return pipe.
5	Pinion pin.
6	Drive pinion.
7	Key.
8	Body cap screw.
9	Oil level gauge.
10	Drive shaft, with pins.
11	Gear pin.
12	Gasket.
13	Gear housing, with dowel.
14	Auxiliary body gear (12 teeth).
15	Auxiliary idler gear (12 teeth).
16	Gasket.
17	Cover.
18	Pump float.
19	Body gear (12 teeth).

ENGINE - Continued

Removal of the Oil Pump

Remove the crankcase guard and oil pan from the engine, and remove cap screws holding the oil return pipe (4), *Illust. 1*. Remove the pump assembly from the engine by removing the two body cap screws (8) from the flange above the main body of the pump.

Disassembly of the Oil Pump

Pull the cotter key from the cover (17), and remove the pump float (18). Remove the cap screws holding the cover. The cover (17), gasket (16), auxiliary body gear (14), auxiliary idler gear (15), auxiliary gear housing (13), gasket (12), and large pump body idler gear (2) can now be disassembled.

Check for end play in the shaft (10). If necessary, drive out the pinion pin (5) and remove the drive pinion (6) and the key (7) from the drive shaft. Pull the drive shaft with the body gear (19) from the body (1). The body gear (19) can be removed from the drive shaft by driving out the pin (11) and pulling the gear from the shaft. Remove the key from the shaft.

Service of the Oil Pump

Check all the gears, body, gear housing, drive shaft, and cover for wear. The idler shaft in the body is a press fit and is located with the end of the shaft 2-5/32" from the base of the body. Backlash in gears can be .003" to .006". A dowel pin (3) locates the cover (17), gear housing (13), and body (1).

The idler shaft should be concentric with the body bore and square with the bottom of the gear chamber within .001". The drive (19) and idler (2) gears should have .0065" clearance between the body bore and the outside diameter of the gear. Use a 1/2" wide, .0065" feeler gauge between the body and gear; turn the pinion several rev-

olutions when checking the clearance.

Reassembly of the Oil Pump

Place the key in the shaft and assemble the body gear (19) and then drive in the pin (11). Peen the ends of the pin to hold it in place. Take care not to strike the gear, and be sure that the pin does not stick up in the bottom of the tooth.

Place the drive shaft (10) in the body (1). Assemble the key (7) and the pinion gear (6), replace the pinion pin (5), and peen the ends of the pin. Be sure the pin does not interfere with the bottom of the tooth and that the gear is not damaged when the pin is peened.

Assemble the idler gear on the idler shaft, and push it into the body. Place a thin coat of pressure-gun grease on the surface where the gasket (12) contacts the auxiliary gear housing (13), to keep them in line while assembling.

Assemble the auxiliary gear housing and the gasket to the body. The dowel pin (3) in the gear housing locates the two parts. The gasket is .006" thick and serves as a shim to obtain .003" to .005" end play of the drive shaft when the pump is completely assembled.

Place the auxiliary body gear (14) on the drive shaft (10), and the auxiliary idler gear (15) on the idler shaft. Assemble the gasket (16) to the cover (17), replace the cap screws and tighten. The driveshaft gears should turn freely when assembled.

If the return pipe (4) should be loose in the cover, remove it and give it another coat of babbitt. Scrape off any surplus material that interferes with the pipe being assembled as a tight fit in the cover. Replace the pump float (18) in the cover, inserting the cotter key in the hole in the cover to hold the float in place.

ENGINE - Continued

Replacement of the Oil Pump

Place the oil pump in the crankcase, replace the cap screws (8), and tighten. Lock the cap screws by placing a wire through the holes in the heads and twisting the ends together. Replace the cap screws holding the return pipe (4) to the crankcase. Replace the oil pan and fill with the proper amount of lubricating oil.

Cylinder Head

The cylinder head contains the conventional intake and exhaust valves of overhead design. In addition, the starting valves are assembled to the head; when open for starting on the gasoline cycle, they increase cylinder volume, decrease compression ratio and expose spark plugs for starting as a gasoline engine. Service of valves and head is the same as for any conventional engine. The hood sheet and valve mechanism must be removed to remove the cylinder head. Be sure that the compression release lever is on the Diesel cycle before starting service work.

The cylinder head is removed when valves and valve seats need reconditioning, when the gasket is leaking, or when the pistons, connecting rods, or cylinder sleeves are to be taken out. Whenever the head is off for valve reconditioning, inspect the sleeves for wear.

Removal of the Cylinder Head

Remove the hood sheet, air cleaner pipe to the intake manifold, the valve-lever housing and valve rocker arms as described under the "Valve Mechanism" in this section. Drain the radiator, disconnect the water outlet elbow from the front of the cylinder head, and disconnect the injection pipes at the pump and nozzles. Place caps on the pump and nozzles to protect them from dirt. Disconnect the clip on the No. 4 injection pipe

from the head. It is not necessary to remove the injection nozzles unless a new cylinder head is being installed.

Shut off the valve on the gasoline tank and disconnect the fuel line at the carburetor. Disconnect the primer rod at the control rod end; also the cable to the choke control. Disconnect the wires and remove the spark plugs. This is a precaution to prevent damage to the plugs while servicing the cylinder head. Disconnect the link between the starting control mechanism and the carburetor. Remove the end cover and disconnect the short-circuiting cable from the intake manifold. Take out the six nuts holding the exhaust manifold to the cylinder head, and lift off the manifold. Remove the four nuts holding the intake manifold and lift off this manifold.

Remove all the manifold gaskets and the valve push rods (10), *Illust. 2*. Remove all nuts holding the cylinder head (45), and take off the head. Remove the cylinder head gasket (15) and gasket rings (14).

Disassembly of the Cylinder Head

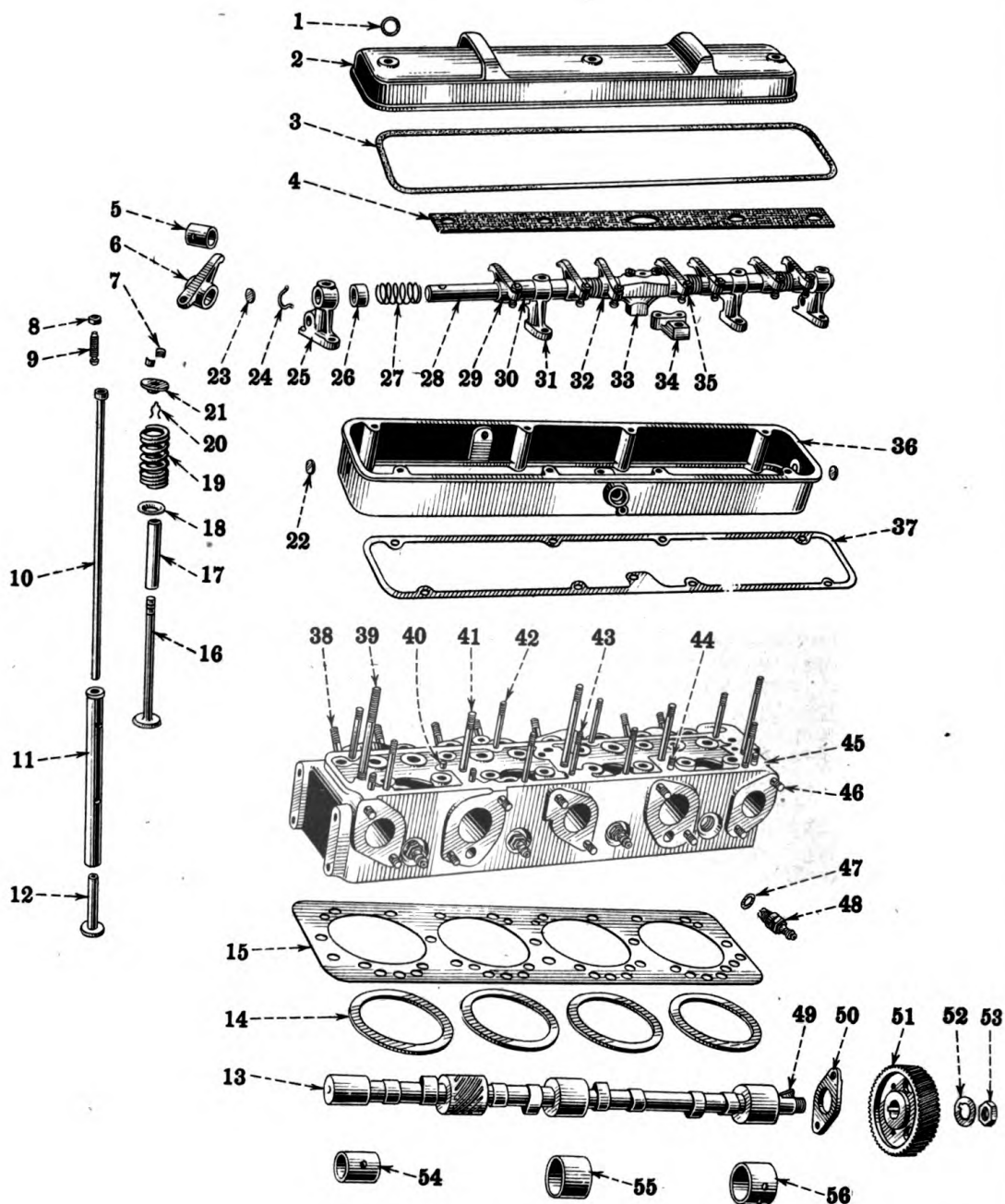
Place the cylinder head on a bench with a small block to support the valves when the springs are depressed. Be sure to keep the valves in order and replace them in their original positions.

To remove the valves (16), *Illust. 2*, depress the upper seat (21) and remove the keys while holding head of valve stationary. Lift off the upper seat and the spring (19) and remove the retainer (20) and lower seat (18). Tip the head on its side and withdraw valves.

To remove the starting valves (17), *Illust. 3*, remove the cotter key from the retainer (14) and unscrew it. The valves can then be removed from the head. Be sure to keep the valves in proper order.

REPAIR SECTION

ENGINE - Continued



B-360

Illustr. 2
Exploded View of the Cylinder Head, Valves, and Camshaft

ENGINE - Continued

Cylinder Head - Continued

Ref. No.	Description
1	Washer.
2	Cover.
3	Gasket.
4	Oiler felt.
5	Lever bushing.
6	Lever with bushing, right hand.
7	Key.
8	Nut.
9	Adjusting screw.
10	Push rod.
11	Tappet guide.
12	Tappet.
13	Camshaft.
14	Gasket ring.
15	Gasket.
16	{Exhaust valve.
17	{Intake valve.
18	Guide.
19	Lower seat.
20	Spring.
21	Retainer.
22	Upper seat.
23	Plug.
24	Plug.
25	Retainer ring.
26	End bracket.
27	Spacer, outer.
28	Spring.
29	Shaft, complete with re- tainer ring and plug.
30	Lever, straight, with bushing.
31	Spacer, intermediate.
32	Intermediate bracket.
33	Lever with bushing, left hand.
34	Center bracket, upper half.
35	Center bracket, lower half.
36	Lever with bushing, right hand.
37	Housing.
38	Gasket.
39	Nozzle body stud.
40	Bracket stud, long.
41	Locating pin.
42	Intermediate bracket stud.
43	Valve housing stud, long.
44	Valve housing stud, short.
45	Bracket stud, short.
46	Cylinder head.
47	Manifold stud.
48	Spark plug gasket.

Ref. No.	Description
48	Spark plug.
49	Key.
50	Thrust plate.
51	Gear.
52	Nut lock.
53	Nut.
54	Rear bearing.
55	Center bearing.
56	Front bearing.

Repair of Valves and Head

All the valve guides (17), *Illust. 2*, and (16), *Illust. 3*, in the head are replaceable. The starting-valve guides (16), should be assembled 15/16" below the top of the cylinder head. The exhaust and intake valve guides (17), *Illust. 2*, should be assembled with the sharp-edged chamfer at the top and the top shoulder 1-3/8" above the top of the cylinder head.

The guides can be driven out by using a rod with a diameter slightly smaller than the outside of the guide.

Guides can be replaced by placing a piece of wood on the end of the guide to protect it and driving it into the head to specified distance.

Reassembly of the Cylinder Head

Clean all the carbon off the top of the pistons and cylinder head. Remove all foreign material off the mating surfaces of the engine block and cylinder head. Do not let any carbon or dirt fall into the engine through the push-rod openings or in the cylinders.

Insert the valves (16), *Illust. 2*, in the cylinder head in proper order and support them with a block of wood. As each valve is inserted, place the lower seat (18) with the outside edge of the seat on the cylinder head and replace the retainer (20).

REPAIR SECTION

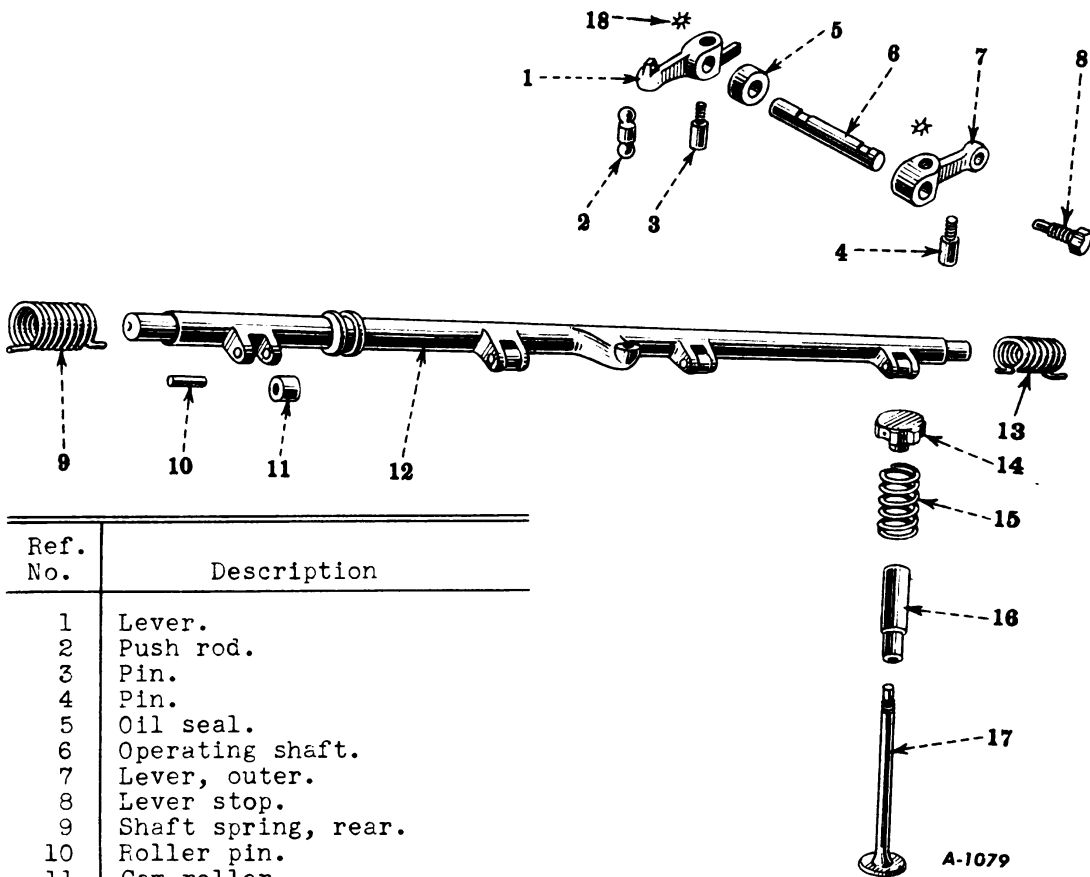
ENGINE - Continued

Replace the spring (19) and the upper seat (21) on the stem and depress until the keys can be inserted in the end of the stem, tapered ends down.

Replace the starting valves (17), *Illust. 3*, in the head in proper order; place the springs (15) on the stems and screw the retainers (14) down until they are .240" to .250" above the cylinder head. Then replace the cotter keys.

Replacement of the Cylinder Head

Place the gasket rings (14), *Illust. 2*, on the cylinder block with the flange side facing up
NOTE: In the event new gasket rings are not available when reassembling the engine, the old rings should be annealed. These gasket rings, being made of copper, become hardened in use. Annealing restores flexibility, which facilitates maintaining a gas-tight seal. To anneal the gasket rings,



Ref. No.	Description
1	Lever.
2	Push rod.
3	Pin.
4	Pin.
5	Oil seal.
6	Operating shaft.
7	Lever, outer.
8	Lever stop.
9	Shaft spring, rear.
10	Roller pin.
11	Cam roller.
12	Starting valve shaft, with roller and pin.
13	Shaft spring, front.
14	Retainer.
15	Valve spring.
16	Valve guide.
17	Valve.
18	Starting valve operating shaft pin lock washer.

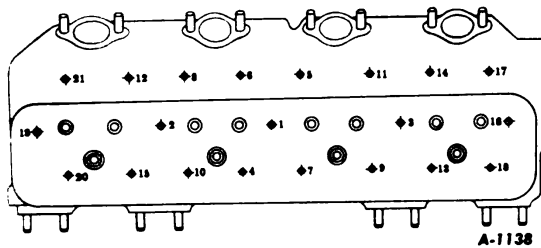
Illust. 3
Exploded View of Starting Valve Mechanism.

ENGINE - Continued

Replacement of the Cylinder Head - Continued from page 7

heat to a dull red heat and quench in water.

Grease both sides of gasket and carefully place it on the studs with side marked "Top" facing up. Be sure no foreign material is adhering to the gasket, crankcase, or cylinder head. Place the cylinder head on the engine and run down the nuts.



Illust. 4
Cylinder Head Nut Tighting Sequence.

Following the sequence given on the Chart, *Illust. 4*, start with No. 1, drawing each nut down a little. Repeat the operations several times, drawing the nuts down a small amount each time. Check with a torque wrench to see how much the nuts have been tightened. The nuts are to be tightened to 190 ft.-lbs. Repeat the operation with the torque wrench. After nuts have been drawn to the final torque go back over the nuts, following the sequence diagram, to make sure those already tightened are not now below 170 ft.-lbs. torque because the entire head has been pulled down.

Replace the valve push rods (10), *Illust. 2*, in the head. Replace the lower half (34) of the valve lever shaft center bracket, with the cap screw holes toward the valve side of the head. Replace the valve-lever assembly as described under the "Valve Mechanism" in this section.

Replace manifolds, ground wire for the starting system, carburetor connections, cooling system connections, injection pump tubing, etc., in the reverse order of removal. Bleed air from the fuel injection system as described in the "Operations Section".

Adjust the clearance between the starting valve retainer and cam roller as described under the "Starting System" in Section X. Adjust clearance between intake and exhaust valves and levers as described in the "Operations Section".

Replace the valve housing but leave off the valve-housing cover for readjustment of valve clearances after the engine has been warmed up. Refill the cooling system, start the engine and bring it up to operating temperature. Readjust the intake and exhaust valves to .018". Replace the valve housing cover and hood. Replace the air cleaner pipe.

Valves

Specifications

Valve seat width 3/32"

Valve seat angle 45°

Stem guides (replaceable). Grey Iron

Stem Diameter

Intake valves4325"

Exhaust valves.4315"

Stem clearance in guide

Intake valves . .002" to .004"

Exhaust valves .003" to .005"

Tappet clearance, hot.018"

Valve spring, free length. 2-7/8"

Valve spring

test . . 50 to 56 lbs. at 2-1/2"

REPAIR SECTION

ENGINE - Continued

Specifications - Continued

Valve lever shaft
diameter9660" to .9665"

Valve lever clearance
in bushing0015" to .002"

Valve lever bushing length. 1-1/4"

Intake Valves Specifications

Head Diameter. 2"

Port Diameter. 1-3/4"

Lift 1/2"

Valve opens. 10° before TDC

Valve closes 25° after LDC

Exhaust Valves Specifications

Head Diameter 1-3/4"

Port Diameter 1-1/2"

Lift 1/2"

Valve opens 43° before LDC

Valve closes 10° after TDC

Starting Valves Specifications

Head Diameter. 1-9/32"

Stem Diameter3715"

Valve guide replaceable. . . . Yes

Clearance in guide0025"

Valve seat width 3/64"

Removal of the Valve Mechanism

Remove the gasoline tank cap and the hood sheet, and the air cleaner pipe to the intake manifold.

Remove three nuts with copper gaskets from the valve housing cover (2), *Illust. 2*, and lift it off with the gasket. Lift off the wick (4) and disconnect the starting-valve operating shaft lever (7), *Illust. 3*, on the outside of the valve housing. Loosen all the adjusting screws on the valve levers (6), *Illust. 2*. Remove nuts around the outside of the valve housing (36) and the cap screws and nuts on the valve lever brackets (25), (31), and (33). Lift off the valve mechanism and the valve housing as a unit.

Disassembly of the Valve Mechanism

Remove the nut from the pin (3) *Illust. 3*, in the operating lever (1) on the inside of the valve housing and drive out the pin. Remove the operating lever by pulling on the lever outside the housing. The valve housing can now be removed from the valve assembly. Loosen the jam nuts and set screws on the upper and lower center brackets (33) and (34), *Illust. 2*. The shafts (28), with levers (6), (29), (32), and (35), springs (27), and spacers (26) and (30) are now slipped out of the center bracket. The levers, springs, spacers, and starting-valve shaft are now removed from the shafts for repair.

Repair of the Valve Mechanism

Bushings (5) in the valve levers (6), (29), (32), and (35) can be replaced; they should be reamed to sizes as listed in the Valve Specifications. In replacing bushings, be sure holes in the levers line up with holes in the bushings. The valve lever shaft (28) can be checked for wear with specifications.

When it is necessary to replace an intake or exhaust valve, first ream the valve seat with the proper reamer and then lap in the new valve. The valve seat should be 3/32" wide. Remove all grinding

ENGINE - Continued

Repair of the Valve Mechanism - Continued

compound from the guide, valve, and seat and then oil the valve stem well.

Check the valve springs (19) to the specifications.

Valve Service Tools Available

(Valve Guides)

SE-1202-3 - Cleaner

SE-640 Reamer

(Intake)

SE-1235 - 45° Valve Seat Reamer, Finish

SE-1223 - 45° Valve Seat Reamer, Rough

SE-1225 - 75° Valve Seat Reamer, Rough

SE-1227 - 15° Valve Seat Reamer, Rough

SE-903 - Reamer Pilot

(Exhaust)

SE-1236 - 45° Valve Seat Reamer, Finish

SE-691-1 - 45° Valve Seat Reamer, Rough

SE-1225 - 75° Valve Seat Reamer, Rough

SE-691-2 - 15° Valve Seat Reamer, Rough

(Valve Lever Bushings)

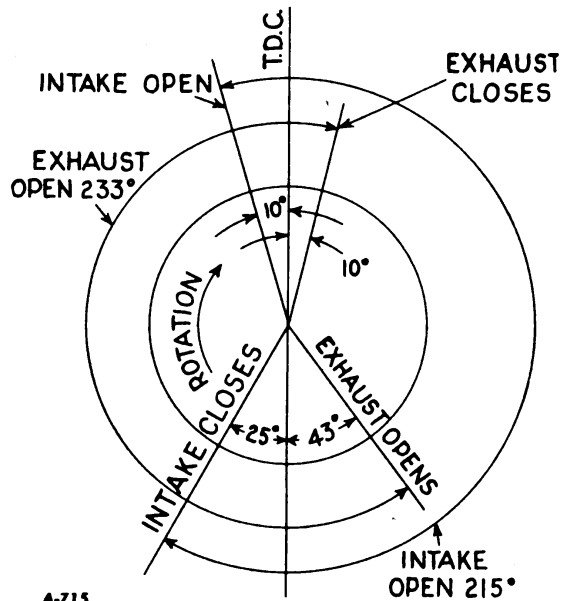
SE-945 - Reamer Body

SE-873-5 - Reamer Blades

SE-877-1 - Reamer Pilot

Reassembly of the Valve Mechanism

Reassembly of valve mechanism is the reverse of disassembly procedure. When replacing the valve levers on the shaft, be sure the spacers are in the correct place and that the right, left, and straight levers are in the proper place. Analyzing the two groups of four, the center two are straight,



Illust. 5
Engine Valve Timing Diagram

with a left and right at the respective ends. When replacing valve springs on the cylinder head, be sure the end of the spring, when the coils are close together, is assembled against the cylinder head.

Replacement of the Valve Mechanism

Replace the valve lever assembly on the studs from which it was removed. Be sure the collar on the starting-valve shaft (12), *Illust. 3*, is over the locating pin (40), *Illust. 2*, on the cylinder head.

Replace the oil seal (5), *Illust. 3*, in the valve housing, with the lip of the seal to the outside. Replace the valve housing (36), *Illust. 2*, and the gasket (37). Replace the operating shaft (6), *Illust. 3*, through the hole in the valve housing. Then place the inner lever (1) on the shaft and fasten with the drive pin (3) and hex. nut.

Adjust the valve tappet clearance as described in the "Operations

ENGINE - Continued

Replacement of the Valve Mechanism - Continued

Section", and then readjust after the engine is hot. Replace the felt wick over the valve mechanism and the gasket and the cover on the housing. Replace the hood sheet, air intake pipe, and the

gas tank cap.

Connect the outer lever, to the starting mechanism. Check clearance between rollers and starting valves. If it is not .060", see the "Starting System", Section 10, for adjustments.

Camshaft

Bearings, number	3
Bearing material	(Steel back) Babbit lined
Bearing Journal Diameter, front	2.618" to 2.619"
Bearing Journal Diameter, center	2.368" to 2.369"
Bearing Journal Diameter, rear	1.7475" to 1.7485"
Running clearance . . . . .	.0015" to .0035"
Bearing length, front	2-1/16"
Bearing length, center	2"
Bearing length, rear	2-3/16"
End Clearance . . . . .	.005" to .011"
Camshaft drive	Helical gear
Number of teeth in gear	54
Pressure lubricated . . . . .	.Yes

The slot in the front bearing journal allows a small amount of oil to flow from the oil passage in the crankcase to the valve lever mechanism with each revolution of the camshaft.

Removal of the Camshaft

In the removal of the camshaft (13), *Illust. 2*, from the cylinder block, it is assumed that the engine has been removed from the tractor. The fuel injection pipes should be removed to prevent damage when the crankcase is laid on the pump side for camshaft service.

Remove the valve-lever assembly and push rods as described under the "Valve Mechanism" in this section. Remove the oil pan, the crankcase front cover, and the oil pump as described under those subjects. Remove the idler gear (49), *Illust. 7*, by bending back the corners of the bolt lock (51) and removing the two cap screws, through the thrust washer (50).

Turn the camshaft gear (51), *Illust. 2*, until the hole in the gear lines up with the head of the cap screw holding the thrust plate (50). Then remove the cap screw.

ENGINE - Continued

**Removal of the Camshaft -
Continued**

Repeat the operation to remove the second cap screw. Reach up from the bottom of the crankcase and push the tappets (12) toward the top of the crankcase as far as they will go. The camshaft can now be removed from the crankcase by pulling on the gear (51).

Bend the washer (52) down and remove the nut (53). Using a gear puller, remove the gear (51) from the camshaft, and take off the thrust plate, and the key (49).

Repair of the Camshaft

Inspect the camshaft bearing surfaces and check to the dimensions given in the specifications. The groove in the front bearing journal meters oil to the rocker-arm assembly.

In order to facilitate the replacement of the camshaft bearings (54), (55), and (56), remove the fly-wheel and the rear engine support (1), *Illust. 7*, and drive out the plug (21) in the rear of the crankcase by using a long bar placed against the plug from the front end of the crankcase and tapping with a hammer; or by drilling a hole in the plug to pull it out.

Drive out the bearings by using a brass rod placed against the edge of the bearing and tapping. Move the end of the rod around the edge of the bearing as tapping proceeds, to prevent the bearing from jamming in the boss.

Replacement bearings are furnished reamed to size. In replacing the bearings, be sure all the holes in the bearings line up with the holes in the crankcase.

The front bearing (56), *Illust. 2*, is pressed flush with the front end of the crankcase by placing a block of wood across it and tapping with a hammer. Be sure the

bearing is started square with the crankcase so that it does not bind. Repeat the above procedure for the center bearing (55), pressing it flush with the boss inside the casting. Drive the rear bearing (54) so that the inner end is $1/8"$ inside the inside end of the boss in the crankcase.

Replacement of the Camshaft

Place the thrust plate (50), *Illust. 2*, on the camshaft (13) with the countersunk surfaces toward the threaded end of the shaft. Insert the key (49) in the shaft and press on the gear (51). Be sure the lettered side of the gear is outside. Replace the nut lock (52), tighten the nut (53), and bend down the edge of the nut lock to lock the nut.

Place the camshaft in the crankcase and tighten the cap screws on the thrust plate (50). Be sure the face of the gear (51) runs true with the front plate (15), *Illust. 7*, on the engine. If this is not done, the timing gears will be noisy. Clearance between the thrust plate and the gear, when all are assembled, should be .005" to .011".

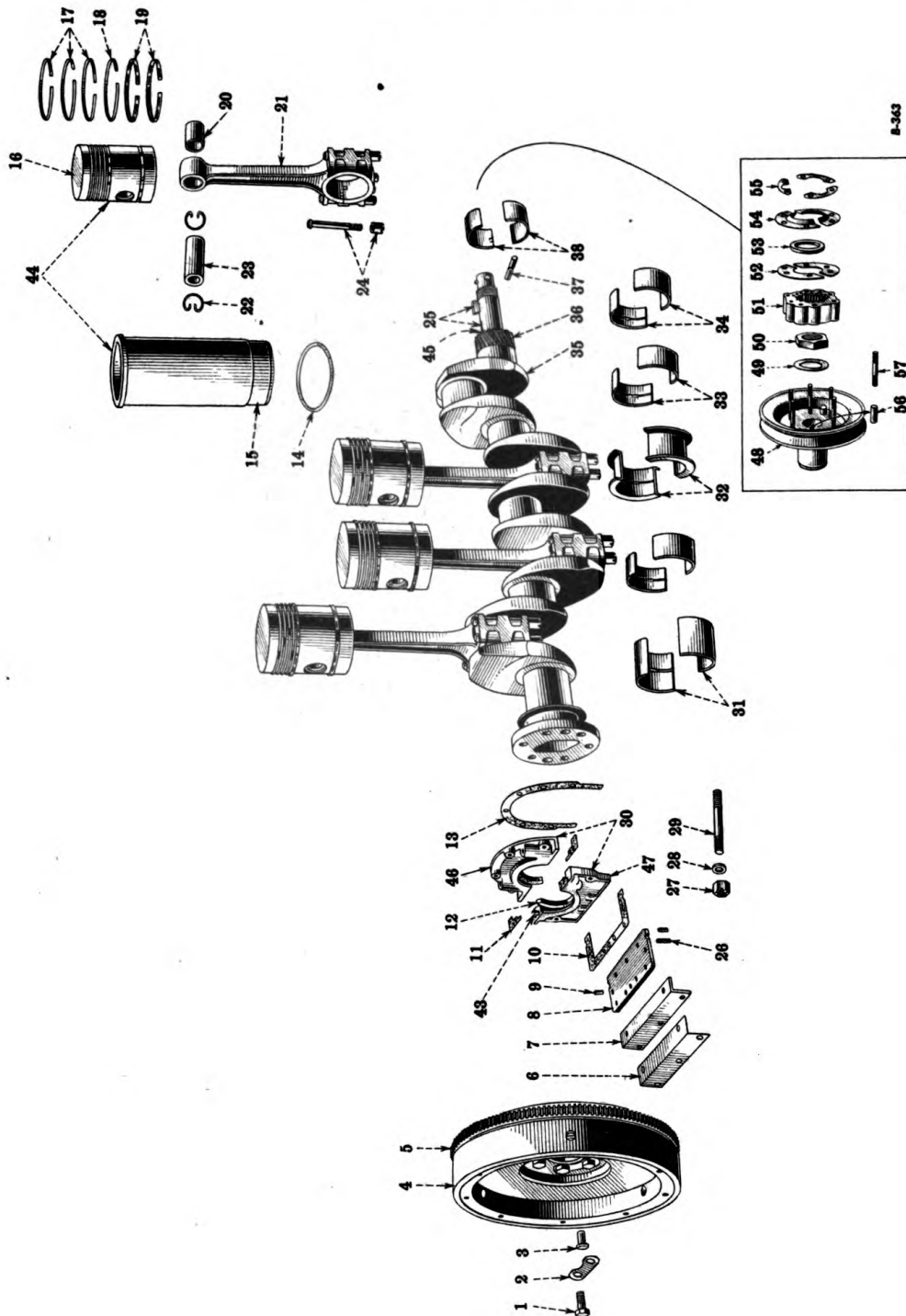
Replace the idler gear (49). The gears are punch marked "C", "P", and "S". Be sure all marks correspond when the idler gear is slipped on the shaft. Replace the idler thrust washer (50), bolt lock (51) and tighten the cap screws. Lock the idler cap screws by bending down the corners of the bolt lock.

Replace the crankcase front cover as described under that subject, and the oil pan. Replace the plug in the rear of the crankcase with a new one. Place a good sealer on the edge of the plug and put the plug in the crankcase. Using a bar slightly smaller than the plug, set the plug.

Replace the rear engine support (1), and all other parts removed.

REPAIR SECTION

ENGINE - Continued



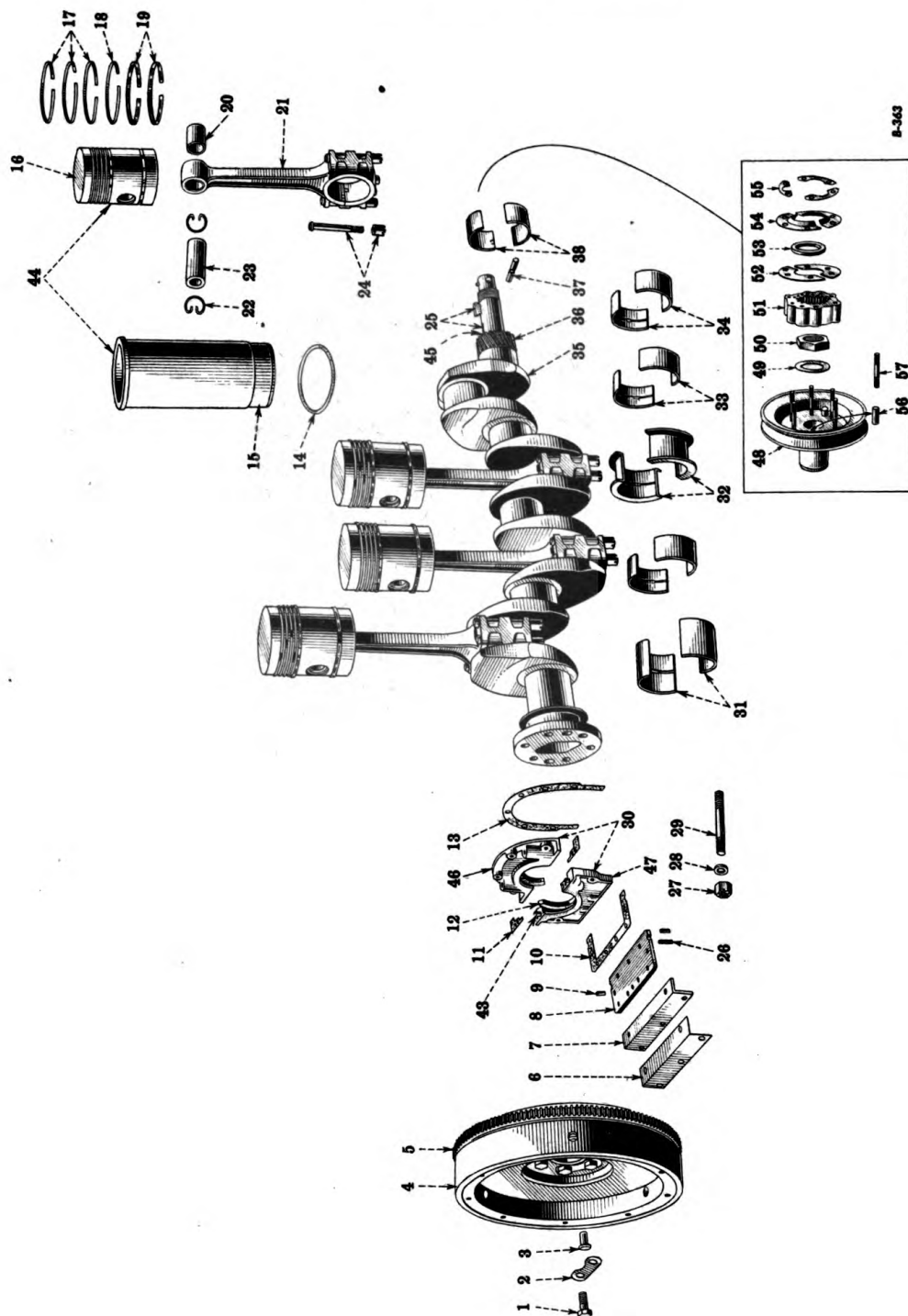
Illustr. 6
Exploded View of the Crankshaft, Connecting Rods, Pistons, and Cylinder Sleeves

ENGINE - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Bolt.	19	Oil regulating ring.	38	Connecting rod bearing.
2	Bolt lock.	20	Bushing.	43	Dowel.
3	Dowel.	21	Connecting rod.	44	Sleeve and piston.
4	Flywheel, with ring gear.	22	Retainer.	45	Crankshaft gear key.
5	Ring gear (146 teeth).	23	Piston pin.	46	Oil seal retainer, upper.
6	Gasket.	24	Bolt.	47	Oil seal retainer, lower.
7	Dust seal.	25	Key.	48	Pulley.
8	Plate.	26	Stud.	49	Nut lock.
9	Felt plug.	27	Nut.	50	Nut.
10	Gasket.	28	Washer.	51	Coupling.
11	Gasket.	29	Stud.	52	Shaft retainer.
12	Felt.	30	Oil seal retainer.	53	Felt washer.
13	Gasket.	31	Bearing, rear.	54	Felt retainer.
14	Packing ring.	32	Bearing, center.	55	Lock.
15	Sleeve.	33	Bearing, intermediate.	56	Pin.
16	Piston.	34	Bearing, front.	57	Stud.
17	Compression ring.	35	Crankshaft.		
18	Compression ring (taper face).	36	Gear (27 teeth).		
		37	Crank pin.		

REPAIR SECTION

ENGINE - Continued



Illustr. 6
Exploded View of the Crankshaft, Connecting Rods, Pistons, and Cylinder Sleeves

ENGINE - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Bolt.	19	Oil regulating ring.	38	Connecting rod bearing.
2	Bolt lock.	20	Bushing.	43	Dowel.
3	Dowel.	21	Connecting rod.	44	Sleeve and piston.
4	Flywheel, with ring gear.	22	Retainer.	45	Crankshaft gear key.
5	Ring gear (146 teeth).	23	Piston pin.	46	Oil seal retainer, upper.
6	Gasket.	24	Bolt.	47	Oil seal retainer, lower.
7	Dust seal.	25	Key.	48	Pulley.
8	Plate.	26	Stud.	49	Nut lock.
9	Felt plug.	27	Nut.	50	Nut.
10	Gasket.	28	Washer.	51	Coupling.
11	Gasket.	29	Stud.	52	Shaft retainer.
12	Felt.	30	Oil seal retainer.	53	Felt washer.
13	Gasket.	31	Bearing, rear.	54	Felt retainer.
14	Packing ring.	32	Bearing, center.	55	Lock.
15	Sleeve.	33	Bearing, intermediate.	56	Pin.
16	Piston.	34	Bearing, front.	57	Stud.
17	Compression ring.	35	Crankshaft.		
18	Compression ring (taper face).	36	Gear (27 teeth).		
		37	Crank pin.		

ENGINE - Continued

Connecting Rods

Length, center to center	13-1/4"
Crank pin diameter	3.248" to 3.2485"
Bearing material	Copper lead (Steel back)
Bearings length, total	2-1/16"
Bearings, running clearance . . . . .	.003" to .004 "
Rod end clearance . . . . .	.005" to .012"
Bolts, number	4
Bolts, size	1/2"
Bolts, torque, foot-lbs.	70

Connecting rods (21), *Illust. 6*, should be straight, free from twist, and parallel with the piston (16). The cylinder numbers are stamped on the rod and cap -- No. 1 starts at the front end of the engine. Assemble the numbered side toward the camshaft. The clearance may be checked by placing a .003" brass shim (1/4" wide by 1-1/4" long) lengthwise between the lower bearing and the crankshaft. If the clearance is not excessive there should be a slight drag when turn-

ing the crankshaft with the spark plugs removed. When installing bearings, be sure that the bearing backs and rod surfaces are absolutely clean, smooth, and free from oil. The bearings have a nib engaging the milled notch in the rod and cap. The connecting rods (21) are removed from the bottom of the crankcase. The piston and rod assembly can be taken out after turning the crankshaft to the side so the piston will clear as it is pulled out of the crankcase. Then pull down on the rod. Be sure the piston does not hit the shaft or crankcase. Bearing caps are held to the rods with four bolts and nuts (24). A torque wrench should be used to tighten these bolts to 70 ft.-lbs. The nuts have slotted heads for locking purposes. Tighten beyond 70 ft.-lbs. torque if necessary to make the holes in the bolts line up with the slots in the nuts.

Service Tools Available

Reamer body	SE-949
Reamer blades	SE-949-5
Pilot bushing	SE-949-15
Hone blades	SE-949-10
Burnishing bar.	SE-941

ENGINE - Continued

Piston Assembly

Clearance (at bottom of skirt) . . . . .	.008"
"Go" gauge (1/2" wide) . . . . .	.006"
Light pull	2 to 4 lbs.
"No Go" gauge (1/2" wide) . . . . .	.008"
Tight pull	11 to 14 lbs.

Piston Rings

Total required	6
Compression	4
Oil control	2
Width compression rings . . . . .	.1235"
Width oil control rings . . . . .	.2488"
Gap top compression rings . . . . .	.010" to .020"
Gap bottom compression and oil control rings . . . . .	.010" to .018"
Clearance in groove, top compression . . . . .	.0045"
Clearance in groove, second compression . . . . .	.0035"
Clearance in groove, third and fourth compression and oil control (2) . . . . .	.003"

Piston Pin

Type	Full floating
Retainers	Snap rings
Length.	4.105"
Diameter	1.6250" to 1.6253"
Clearance in rod bushing . . . . .	.0006" to .0009"
Clearance in piston bore. . . . .	.0001" to .0003"

REPAIR SECTION

ENGINE - Continued

Piston Assembly - Continued

The replaceable, wet-liner sleeves (15), *Illust. 6*, are select fitted to pistons (16) to give the normal measured clearance as listed in the specifications. The fourth compression ring (18) from the top of the piston is tapered and should be assembled with the word "top" toward the top of the piston. Two oil regulating rings (19) fit in the two bottom grooves.

When replacing the rings, stagger the ring gaps around the piston. The ring grooves should be clean and free from carbon, and the oil holes in the oil control grooves should be drilled out. Fit the rings to the smallest section of the sleeve. Bathe the piston in oil before replacing it in the engine.

Piston pins (23) are the full-floating type, secured in the piston bosses by retainer rings (22). Heat the piston in hot water to remove or install the pins. An oversize piston pin (.005") is available marked +5 on one end or on one side. The piston bore should be reamed to give the clearances listed in the specifications.

Service Tools Available

Reamer body SE-949
Reamer blades SE-949-5
Pilot bushing SE-949-15
Hone blades SE-949-10
Burnishing bar SE-941

Cylinder Sleeves

Wet-liner type sleeves (15), *Illust. 6*, are used in this engine. They can be removed and replaced easily. They require no honing or boring after assembly. Standard piston and sleeve sets are available for service replacement. The sleeve puller SE-654 is available for removal of the sleeves. Remove the rubber sealing ring (14) from the block and clean the ring groove in the crankcase. Be sure to protect the crankshaft bearing journals with rags when cleaning out the water jackets.

Always use new sealing rings (14) and keep them free of oil and grease. Make a soap solution to which glycerine (1/2 oz. glycerine to a tablespoon of soap and 1 qt. of hot water) has been added. Apply this soap solution to the rings and press them in their grooves in the crankcase just prior to the replacement of the sleeves. Apply the same solution to the bottom of the sleeves on the outside finished surface and allow the sleeve to slip into position. Be sure the rubber sealing rings are engaged all the way around on the taper of the sleeve. Then push the sleeve in place. Wipe out the inside of the sleeves before replacing the pistons and cylinder head.

ENGINE - Continued

Crankshaft

Drilled for pressure lubrication Yes

Bearing journal diameter 3.2480" to 3.2485"

The crankshaft (35), *Illust. 6*, has Tocco-hardened bearing journals and is drilled for pressure lubrication of connecting rod bearings. The running clearance of the bearings can be checked by the same method as the connecting rod bearings. Each bearing cap carries a number which corresponds to a number stamped on the camshaft side of the crankcase. To remove the rear bearing remove the small plate (8) below the bearing. A torque wrench should be used when pulling down the main bearing cap nuts. The amount of torque is 150 ft.-lbs.

Replacement crankshafts with bearings are available in .030" under-size.

For servicing connecting rods and main bearings with the engine in the tractor, the oil pan must be removed. However, when the engine is removed from the tractor the crankshaft is easily removed. Take off the front cover as described under that subject in this section. Remove the bolts from the flywheel (4) and pull the flywheel from the shaft. Then remove the oil pan. Remove plate (8) and take off the rear oil seal retainers (30) with the felts (12) and gaskets (11) and (13). Then remove the cap screws and lift off the rear engine support (1), *Illust. 7*. Remove the connecting rods, the oil pump, and the main bearing cap. Lift out the crankshaft.

When replacing, be sure that the bearing caps, bearings, crank journals, and crankcase are clean and absolutely dry. Place all of the upper bearings in the crankcase, replace the shaft, and attach the bearing caps after oiling the shafts and the bearings. Be careful that the bearings of the caps do not jump out of place when tapping the cap in place. Start with the center main bearing and tighten all stud nuts. Check the nuts with a torque wrench at 150 ft.-lbs. Tighten the nuts further if the holes in the studs do not line up with the slots in the nuts. When all of the nuts are drawn the shaft can be turned over by one hand.

When replacing the flywheel, draw the bolts up to 150 ft.-lbs. torque. Be sure that the bolt locks (2) *Illust. 6*, cover the dowel pins (3).

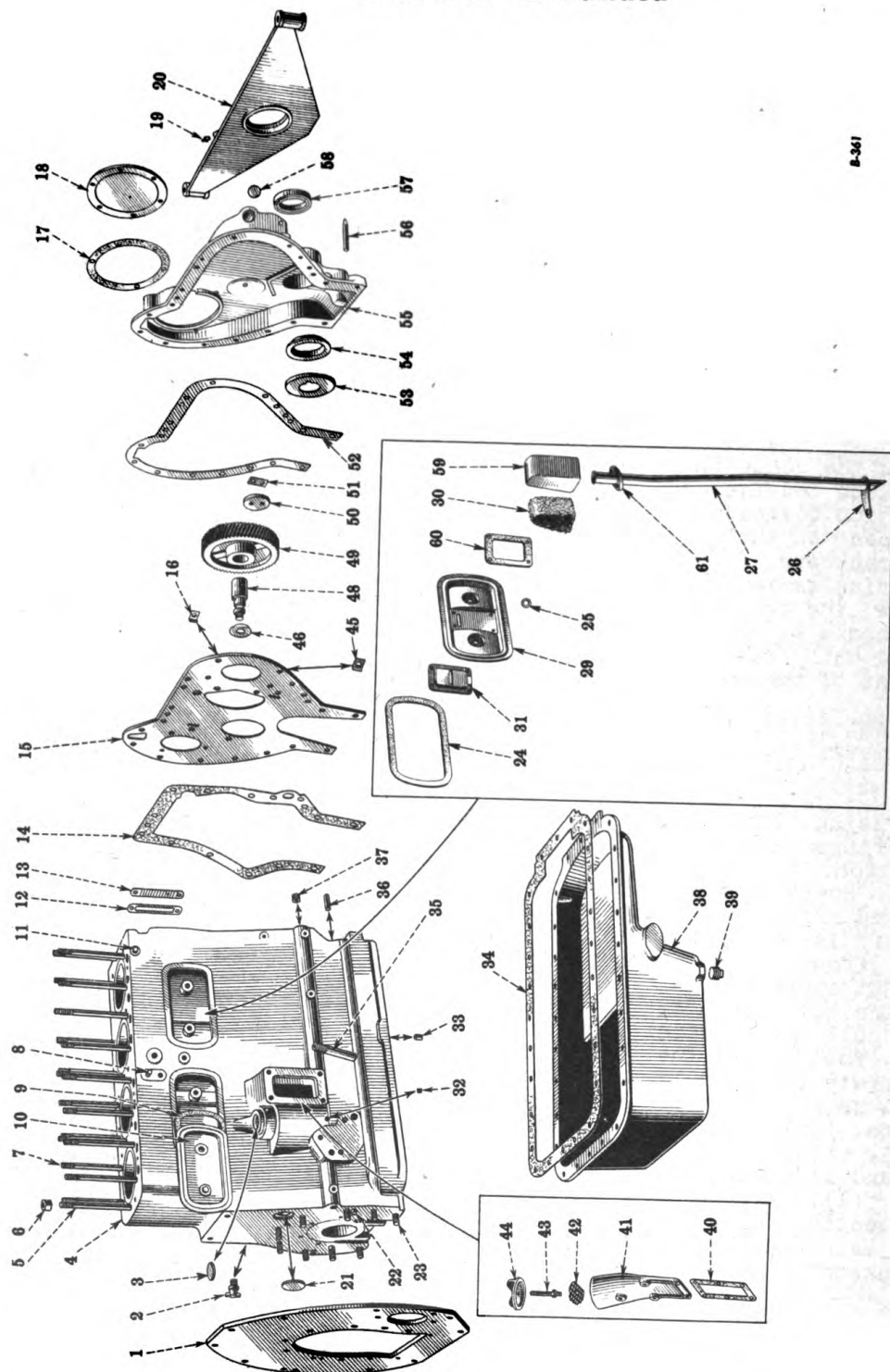
Oil Seals

Front and rear oil seals are provided. The front seal is composed of two felt rings located in the crankcase front cover.

The rear oil seal is the split-type. The flywheel must be removed to replace this oil seal. When the oil leaks behind the flywheel, check the fit of the Welch plug at the rear of the camshaft. Replace the felt, and check the rear main bearing for excessive wear.

REPAIR SECTION

ENGINE - Continued



Illustr. 7
Exploded View of the Crankcase.

REPAIR SECTION

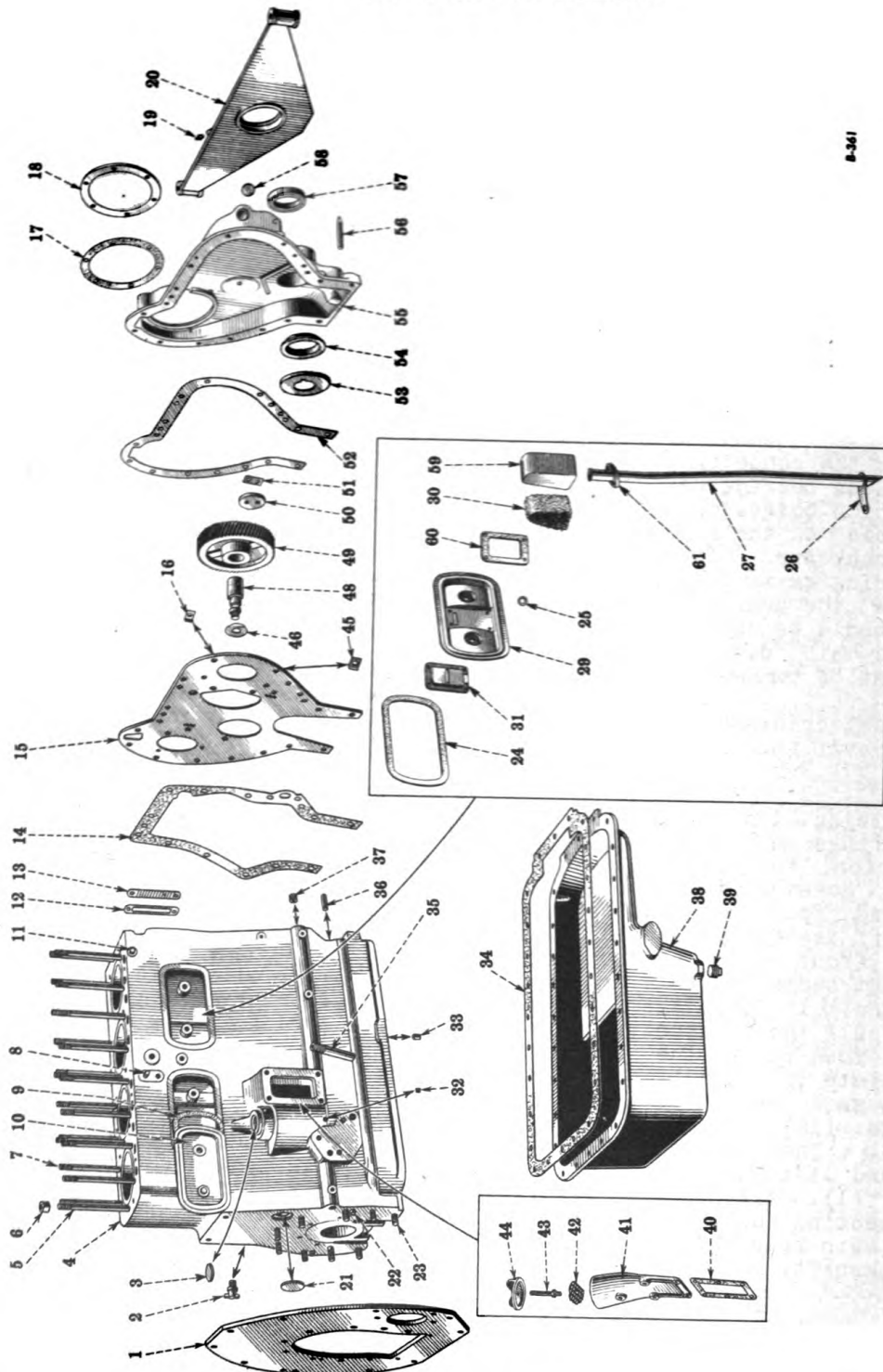
Engine - 3
Page 21

ENGINE - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Rear engine support.	21	Plug.	42	Screen.
2	Drain cock.	22	Dowel.	43	Stud.
3	Plug.	23	Stud.	44	Cap.
4	Crankcase.	24	Gasket.	45	Bolt lock.
5	Stud, long.	25	Washer.	46	Nut lock.
6	Nut.	26	Clip.	48	Idler gear shaft.
7	Stud, short.	27	Breather pipe.	49	Idler gear with bushing.
8	Latch bracket stud.	29	Side plate.	50	Thrust washer.
9	Gasket.	30	Element.	51	Bolt lock.
10	Side plate, rear.	31	Baffle.	52	Gasket.
11	Spring pin.	32	Plug.	53	Oil flinger.
12	Front plate gasket.	33	Plug (wood).	54	Oil deflector.
13	Front plate.	34	Gasket.	55	Front cover.
14	Gasket.	35	Sleeve.	56	Timing pointer.
15	Front plate, with lock.	36	Dowel.	57	Oil seal.
16	Bolt lock.	37	Pipe plug.	58	Welch plug, 1-1/4".
17	Gasket.	38	Oil pan, with plugs.	59	Breather body.
18	Fuel pump gear cover.	39	Pipe plug (magnetic).	60	Breather body gasket.
19	Lubricator.	40	Gasket.	61	Breather pipe flange.
20	Engine support, front, with lubricator.	41	Oil filler body.		

REPAIR SECTION

ENGINE - Continued



Illustr. 7
Exploded View of the Crankcase.

8-341

REPAIR SECTION

Engine - 3

Page 21

ENGINE - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Rear engine support.	21	Plug.	42	Screen.
2	Drain cock.	22	Dowel.	43	Stud.
3	Plug.	23	Stud.	44	Cap.
4	Crankcase.	24	Gasket.	45	Bolt lock.
5	Stud, long.	25	Washer.	46	Nut lock.
6	Nut.	26	Clip.	48	Idler gear shaft.
7	Stud, short.	27	Breather pipe.	49	Idler gear with bushing.
8	Latch bracket stud.	29	Side plate.	50	Thrust washer.
9	Gasket.	30	Element.	51	Bolt lock.
10	Side plate, rear.	31	Baffle.	52	Gasket.
11	Spring pin.	32	Plug.	53	Oil flinger.
12	Front plate gasket.	33	Plug (wood).	54	Oil deflector.
13	Front plate.	34	Gasket.	55	Front cover.
14	Gasket.	35	Sleeve.	56	Timing pointer.
15	Front plate, with lock.	36	Dowel.	57	Oil seal.
16	Bolt lock.	37	Pipe plug.	58	Welch plug, 1-1/4".
17	Gasket.	38	Oil pan, with plugs.	59	Breather body.
18	Fuel pump gear cover.	39	Pipe plug (magnetic).	60	Breather body gasket.
19	Lubricator.	40	Gasket.	61	Breather pipe flange.
20	Engine support, front, with lubricator.	41	Oil filler body.		

REPAIR SECTION

ENGINE - Continued

Main Bearings (Steel Back Precision)

Number	5
Material	Copper Lead
Total Length, front	1-7/8"
Total Length, intermediate	1-3/4"
Total Length, center	2.368"
Total Length, rear	2-11/16"
Running Clearance . . . . .	.003" to .004"
End Clearance : . . . . .	.008" to .012"

When bearing clearance is excessive, replacement is necessary. The clearance may be checked with a pressure tank connected to the lubricating system or by placing a .003" brass shim (1/4" by 1-1/4" long) lengthwise between the lower bearing and the crankshaft. The rate of the oil flow in the first method, and the drag on the crankshaft in the second method, indicates the amount of clearance.

Check the end play by driving a wooden wedge between the crankshaft and the rear of the crankcase, forcing the shaft to the front with the front crankshaft thrust surface tight against the front flange of the center bearing. Remove the wedge and measure the thrust flange clearance on the upper and lower bearing flanges.

Each bearing can be replaced without removing the crankshaft. Tap the bearing cap lightly with the hammer to loosen and remove the cap from the studs. The lower bearing can then be removed from the cap. The upper bearing can be slid out of place by pushing on the end without the nib, using a thin piece of flexible metal while turning the crankshaft over with the hand crank in the direction of removal. The center main bearing has flanged thrust surfaces. To take out the rear bearing remove the small plate (8), *Illust. 6*,

below the bearing. The cap and bore of the bearings are milled to receive the projection on the back of the bearing liner. The projection end is removed first.

When replacing, rotate the shaft so that the projection enters last. The bearing backs, crankcase bore, and cap bore should be absolutely clean and dry when replacing the shells. Put the bearing cap in place with the numbered side facing the numbered side or camshaft side of the crankcase. The main bearing numbers are stamped on the surface to which the oil pan attaches. The ends of the caps fit snugly into the crankcase. Engage one end first and tap the cap into place.

Crankcase Front Cover

When the engine is removed from the tractor, the crankcase front cover (55), *Illust. 7*, can be taken off. After taking out the crank pin in the crankshaft, remove the nut and nut lock from the crankshaft, remove the fan belt, pull the fan drive pulley, remove the two keys from the crankshaft, and then the bolts from around the front cover. The crankshaft front oil seal (57) is located in the front cover. The cover is doweled to the front plate (15) of the engine. The front crankcase support (20) does not have to be removed before taking off the cover.

ENGINE - Continued**Timing Gears**

The timing gear train is accessible when the crankcase front cover is off. The timing gears are driven off the front end of the crankshaft and provide a positive and accurate drive for the camshaft and magneto. These gears must be in their proper place to have the engine timed correctly. The gears are punch-marked and stamped "C", "K", and "S" for proper timing. Replace the idler gear last. Have the other gears arranged to make the letters correspond when assembling the idler gear.

Idler Gear

The idler gear (49), *Illust. 7*, is held to the crankcase by a thrust washer (50) using two cap screws with lock (51). The idler gear slides off the idler gear shaft (48) which is held to the crankcase with a nut and lock (46) fastening on the inside of the case. The pin in the idler shaft locates the hole in the shaft with respect to the hole in the crankcase so that the bushing in the idler gear receives pressure lubrication.

Camshaft Removal

The camshaft removal is covered under "*Camshaft*" in this section.

REPAIR SECTION

MEMORANDA

ENGINE CLUTCH

Size	15"
Manufacturer	Rockford
Type	Single Plate, over-center
Torque Capacity, ft.-lbs.	1050
Throwout Bearing, Type	Ball
Pilot Bearing, Type.	Ball

The hand-operated, over-center clutch with ball-bearing release features two rollers in each release cam to prevent wear and binding.

The release mechanism has a clutch brake which facilitates faster shifting of the transmission gears. No adjustment of this brake is necessary.

Pins on the release carrier (16), *Illust. 1*, have bushings (2) which fit into the release fork (1), reducing wear and friction at this point to a minimum. When replacing the release fork, be sure to engage the bushings in the fork and have the ridged end of the bushings on the inside.

Be sure adjustment of the clutch makes engagement positive. Refer to the "Operations Section" for complete details on adjusting the clutch.

Removal of the Engine Clutch

The engine clutch can be removed through the top of the main frame without disturbing the engine or transmission. However, the clutch must be removed in order to remove the transmission.

With the steering brake pedals locked forward, tie back the steering clutch levers and remove the base of the air cleaner for additional working room. Then remove the main frame cover over the clutch compartment.

With the clutch engaged, remove the nuts and locks from the coupling bolts (29), *Illust. 1*, around the brake friction disc (10) and push out the bolts. Turn the engine over with the hand crank to make all nuts accessible. Next remove the bolts (28) and locks (27) connecting the clutch coupling (8) to the transmission driving flange. This will allow the coupling and ring to be lifted out of place.

Disengage the clutch and remove bolts from the clutch hand lever and the release fork (1). The fork can be removed by driving the shaft through the side of the tractor. Holes in the fender side sheets make this possible. The clutch hand lever will drop off, but the shaft will have to be turned to remove the keys (4). Allowing a chisel to remain in place after driving it, between the clamps of the release fork, makes it easier to slide the release shaft from the main frame.

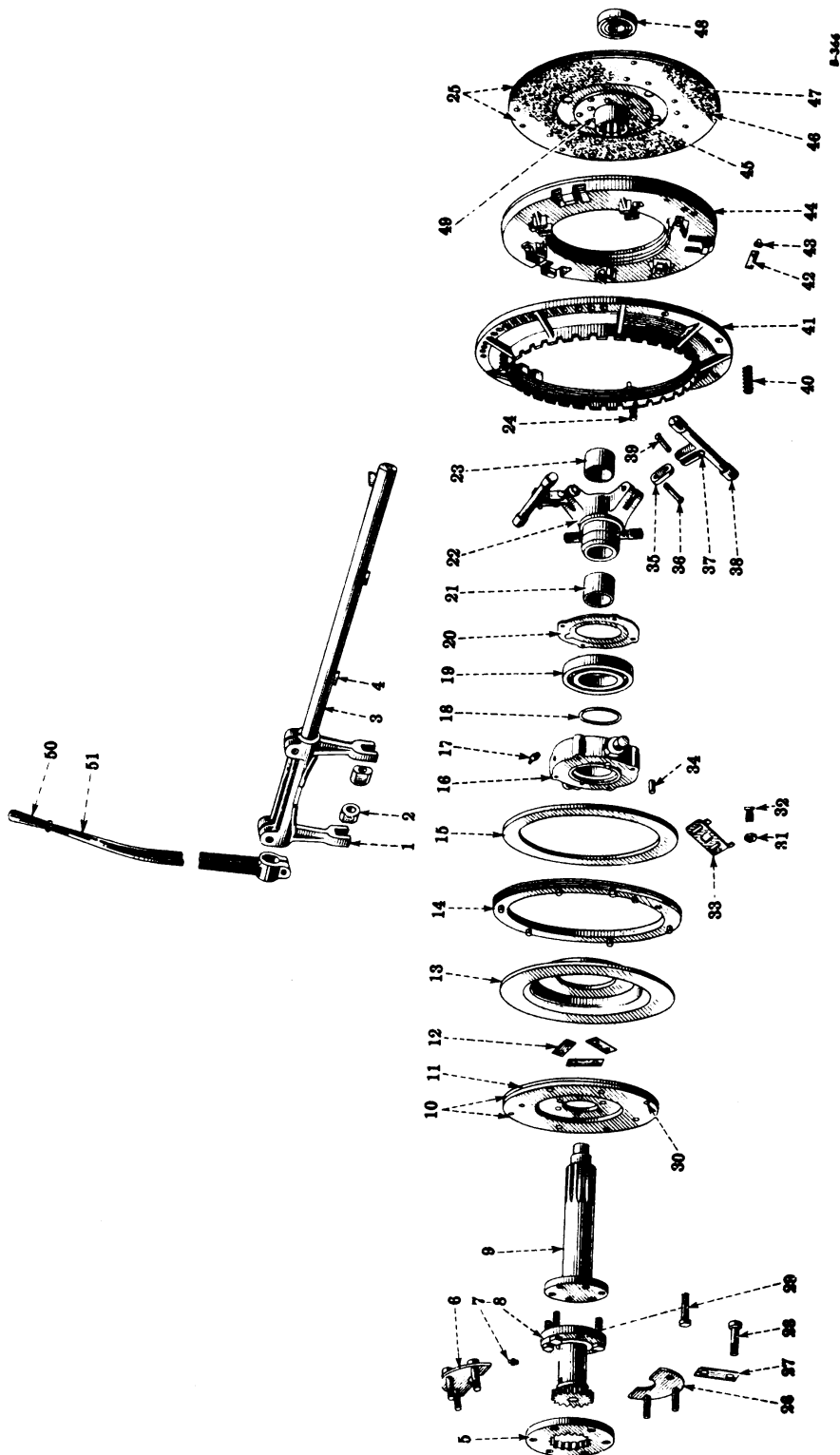
After removing the clutch release fork and bushings, remove the cap screws from the back plate of the clutch, pry out the clutch shaft and lift the entire unit from the main frame.

Disassembly and Repair of the Engine Clutch

Slide the driven member (25) from the clutch shaft (9) and pull the shaft with the clutch brake disc (10) with facing from the release sleeve. Inspect the spline of the shaft, the face of the flywheel,

REPAIR SECTION

ENGINE CLUTCH, - Continued



Illust. 1 - Exploded View of Engine Clutch.

ENGINE CLUTCH - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Release fork.	19	Bearing.	37	Lubricator.
2	Release pin bushing.	20	Plate.	38	Camshaft assembly (set of 3).
3	Release shaft.	21	Bushing.	39	Pin, short.
4	Key.	22	Sleeve with bushings.	40	Return spring.
5	Ring (16 teeth).	23	Bushing.	41	Back plate.
6	Coupling washer.	24	Return spring bolt.	42	Cam block (set of 6).
7	Lubricator.	25	Clutch facing package.	43	Lock.
8	Coupling (16 teeth).	26	Coupling washer.	44	Pressure plate with cam blocks and screws.
9	Shaft.	27	Bolt lock.	45	Rivet.
10	Brake disc with facing.	28	Bolt.	46	Rivet.
11	Brake facing.	29	Coupling bolt.	47	Driven member assembly.
12	Coupling bolt lock.	30	Rivet.	48	Pilot bearing.
13	Brake disc.	31	Lock nut.	49	Clutch plate center.
14	Adjusting ring with lock and pin.	32	Lock bolt.	50	Engine clutch lever rubber handle.
15	Ring plate.	33	Lock.	51	Engine clutch lever.
16	Bearing carrier.	34	Dowel pin.		
17	Lubricator.	35	Link.		
18	Snap ring.	36	Pin, long.		

ENGINE CLUTCH - Continued

Disassembly and Repair of the Engine Clutch - Continued from page 1

the face of the clutch pressure plate (44), and the friction surface of the driven member (47).

If further disassembly is warranted, loosen the adjusting ring lock (33) and turn the adjusting ring (14) from the clutch back plate (41). The ring plate (15) and the release sleeve assembly (22) will all be free for removal. The clutch pressure plate (44) can be removed from the back plate (41) after removing the spring-mounted cap screws.

The release sleeve assembly (22) can be disassembled by taking out the bolts in the brake disc (10), removing cap screws in the release bearing carrier (16), pulling the carrier off the bearing, removing the snap ring (18) from the sleeve and pulling the bearing from the sleeve. Pins with cotter keys hold the cams to the sleeve.

Inspect the driven member (47) for wear of the friction surfaces. Rough or oil soaked facing should be replaced. The facing may be replaced and riveted in place. Be sure the heads of the rivets are well countersunk. Do not replace facing on a warped driven member. The fit of the clutch shaft (9) in the spline of the driven member (47) should be snug, yet allow one to slide freely on the other.

If the pressure plate (44) is heat checked, scored or warped, replace it with a new one. Slight roughness may be polished out. The surface of the flywheel contacting the driven member should be smooth and free of heat checks. If necessary, the flywheel should be removed, and the surface re-machined.

Bushings in the release sleeve (22) should have .001" to .005" clearance with the clutch shaft. The outside diameter of the clutch

shaft is 1.997" to 1.999". Replace the bushings if the clearance is excessive. Replacement bushings are furnished reamed to size. It is only necessary to press them in place. The ends of the bushings are flush with the outside ends of the sleeve.

Worn pins connecting camshafts to the release sleeve should be replaced. Rollers in cams cannot be replaced. Flat or stuck rollers require replacement of the entire cam. Camshafts are available only in sets of three and should not be replaced individually. Cam blocks attached to the pressure plate should be replaced in sets of six, never one at a time. Failure to do so will cause the clutch to wear excessively on one side.

New facings may be attached to the clutch brake and riveted in place.

Reassembly of the Engine Clutch

Clean out all grease fittings in the drilled shaft before reassembling the clutch. With the plate (20) assembled to the sleeve (22) press the bearing (19) onto the sleeve. Then replace the snap ring (18) on the sleeve. Drive the carrier (16) over the bearing (19). Replace the cap screws in plate (20) and carrier (16). Insert dowel pins (34) in the carrier and secure plate (13) to the carrier with the cap screws. Replace the link and pin assembly (35), (36), and (39) between the camshaft (38) and the carrier (16). Be sure the doweled oil hole in the camshaft is open.

Drop the camshaft (38) into the plate assembly (44) with the cam stops facing the back plate (41). With the ring plate (15) in position and the adjusting ring (14) started, bring up the back plate (41) to the plate assembly (44).

Insert the bolts and replace the springs (40) and the nuts and cot-

ENGINE CLUTCH - Continued

Reassembly of the Engine Clutch
- Continued

ter keys. The nuts should be run down the same distance on each bolt to facilitate final adjustment of the clutch. Screw in the adjusting ring (14) until the distance from the face of the plate (44) to the face of the back plate (41) is $31/32$ ". Assemble the disc (10) to the clutch shaft (9) and replace the shaft in the assembly. The driven member (47) can now be placed on the shaft (9). If the splines on either the shaft or the driven member are burred or damaged causing the driven member to stick, the shaft should be replaced. The driven member should slide freely but without play on the shaft.

Replacement of the Engine
Clutch

To replace the clutch in the tractor, drive the pilot bearing (48) into the flywheel face. Then lower the clutch into the main frame. Push the clutch shaft (9) into the pilot bearing. Line up the cap-screw holes in the back plate (41) with those in the flywheel and then run in the cap screws. Set the clutch release fork (1) into position so that the bushings (2) at the bottom line up correctly with the pins of the carrier (46). Also be sure the lubricator fitting (17) is on the top side of the carrier.

Slide the release shaft (3) through the main frame bushing into the

release fork (1). The keys (4) should be inserted in the shaft and the shaft driven into position in the fork. Turn the shaft around and continue driving until it emerges on the opposite side of the main frame.

Assemble the clutch hand lever to the end of shaft (3). Replace the cap screw, and put the cap screws in the release fork (1). Be sure the fork is centered over the carrier (16).

Push the clutch all the way forward to replace the coupling (8), with the teeth in the ring (5) engaging those on the coupling. Engage one of the bolts (29) in the clutch shaft to hold the coupling in place. Line up the holes in disk (10) and push in the rest of the bolts (29). Replace and tighten the nuts and bend the locks. The coupling can be turned to make each one of these accessible. Place one coupling washer (6) against the ring (5) and replace the ring bolts (28) and the bolt locks (27). Then do the same with the lower half of the washer. Pry the ring bolts into the flange, tighten them, and bend the locks.

Adjust the clutch according to instructions in the "Operations Section".

Replace the clutch cover, assemble the cap screws on each side under the fenders, and replace the bottom of the air cleaner.

REPAIR SECTION

MEMORANDA

FINAL DRIVE

Drive Bevel Gear

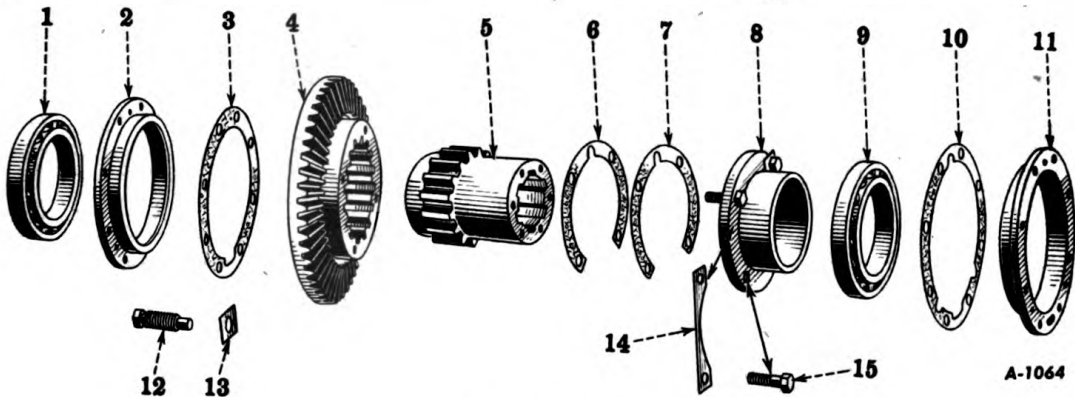
The drive bevel gear assembly is located in a separate compartment directly behind the transmission and between the two steering clutch compartments. The bevel gear and pinion are lubricated from the transmission compartment. Two leather oil seals prevent oil from entering the steering clutch compartment.

Preparation for Removal of the Drive Bevel Gear

Remove the seat, batteries, and fuel tank.

Drain the oil from the transmission. Remove the main frame cover as described under "Preparation for the Removal of the Transmission" in Section 13.

Remove the steering clutches as described under "Steering Clutches" in Section 11.



Illustr. 1
Exploded View of the Drive Bevel Gear

Removal of the Drive Bevel Gear

Assemble puller cap screws to the tapped holes in the right hand bearing cage (11), *Illustr. 1*. Run them out evenly and remove the cage and gasket (10). Loosen the set-screw (12) in the left steering clutch compartment. Bend back bolt locks (14) and remove the bolts (15) in the spacer (8) and the gear (4). Pry the gear and spacer apart and remove shims (6) and (7).

Assemble puller cap screws to the tapped holes and the left bearing cage (2), run them up evenly, and remove the cage with the bearing (1) and the gasket (3).

Ref. No.	Description
1	Bearing.
2	Bearing cage, left hand.
3	Gasket.
4	Drive bevel gear.
5	Hub.
6	Shim, heavy.
7	Shim, light.
8	Spacer.
9	Bearing.
10	Gasket.
11	Bearing cage, right hand.
12	Set screw.
13	Set screw lock.
14	Nut lock.
15	Bolt.

FINAL DRIVE - Continued

Removal of the Drive Bevel Gear - Continued

Drive the hub (5) to the right, out of the ring gear, forcing the spacer (8) and the bearing (9) with it. The bearing can be pulled from the hub (5) and the spacer (8) slid off. The gear (4) can be lifted from the compartment.

Repair of the Drive Bevel Gear

If the bevel gear is to be replaced with a new one, the bevel pinion should also be replaced at the same time. These parts are furnished in matched pairs.

Replacement of the Drive Bevel Gear

Clean the compartment before replacing assembly. Clean it again after the assembly is completed.

Assemble the left hand bearing (1), *Illust. 1*, to the bearing cage (2). The outer race of bearings (1) and (9) are narrower than the inner race. The races of the bearings are flush on one side. Assemble the bearings to the bearing cages so that the flush side is always to the left, or so that the projection side of the inner race is toward the right side.

With gasket (3) secured to the bearing cage (2) in which bearing (1) is assembled, place the unit to the left bore from the steering clutch compartment. Assemble the left bearing cage cap to the bearing cage (2), and then bolt the cap and the cage to the main frame.

Place the bevel gear (4) in the compartment. Insert hub (5) through the right steering clutch compartment into the bore of the bevel gear. Engage the spline of the hub with that in the bore of the gear. Drive the assembly into the bore of the bearing (2) until the spline of the hub strikes the inner race of the bearing.

Place the same number of shims as removed against the bevel gear and slide the spacer (8) into position against the spline of hub (5). Start the bolts (15) with locks (14) in the spacer and gear.

Assemble the right-hand bearing (9) to the bearing cage (11), with the flush side of the bearing to the left and the projection of the inner race to the right. Attach gasket (10) to the bearing cage and push the assembly in place over the hub.

Remove the left-hand bearing cage cap (2).

Assemble the steering clutch shaft coupling to the left and right ends of hub (5).

Assemble the caps to the bearing cages (2) and (11) and draw all bolts tight.

Draw all bolts (15) tight, revolving the gear with the transmission in neutral to make each one accessible.

Adjustment of the Drive Bevel Gear

Check the backlash of the gears. This can be done by wedging the transmission gears and rocking the bevel gear back and forth. A dial indicator touching the face of one of the teeth in the ring gear will give the exact backlash which should be .012". To increase the backlash to this amount remove bolts (15) and add shims between the spacer (8) and the gear (4).

If a new bevel gear and pinion have been installed the pinion must be adjusted for the proper cone setting of the pinion teeth with those of the gear. This is done before replacing the transmission and main frame cover. Do not draw up the bolts tight in the spacer and gear and omit the instructions in the preceding paragraph.

FINAL DRIVE - Continued**Adjustment of the Drive Bevel Gear - Continued**

Place a .625" gauge between the toe end of the pinion and the machined diameter of the bevel gear (4). Drive the bevel pinion shaft to the rear so that this gauge can be held in place. This gauge may be made from 5/8" key stock, 5/8" drill rod, or any narrow object 6 inches long measuring .625". Since there are slight variations in key stock and drill rod, select a piece exactly the size. With the pinion held firmly against the gauge and gear hub, insert the proper number of shims at the pinion shaft front bearing cage to establish the correct position of the pinion with the .625" gauge in place. If, when turning the bevel gear over, a slight run-out on the gear hub or spacer is noted, set the gauge between the tightest and lowest point.

Now adjust the shims between the bevel gear and spacer to obtain the backlash specified above.

As an extra check, apply red lead or prussian blue to the teeth of the pinion. Powdered red lead mixed with a small amount of oil can be formed into a cake and applied to the teeth with a stencil brush. Revolve the gears in a forward direction using the pinion to revolve the gear. Inspect the teeth of the pinion where the paint has been removed. The tooth bearing resulting will be on the toe end of the teeth and should be centered up and down on the active portion of the tooth profile. If the profile bearing is high, use less shims at the front end of the pinion shaft. If the profile bearing is low, use more shims. Re-check the backlash when shims are added or subtracted from the pinion shaft.

Set the bevel gear deflection set-screw (12) to .020" clearance between the end of the screw and the

back side of the bevel gear. Bend back the lock (13) after making the adjustment.

The bearing cage caps and the clutch coupling can now be removed so that the steering clutches can be assembled.

Assemble the steering clutches, transmission, main frame cover, and other items removed. Be sure to refill the transmission case with the proper grade of lubricant.

Sprockets and Sprocket Drive

The power is transmitted from the drive bevel gear through the steering clutches to the sprocket drive gears and sprockets which are ball-bearing mounted on the stationary pivot shaft. The bearings on the pivot shaft are sealed in two self-adjusting, floating diaphragm-type seals. Each sprocket is reversible. It can be removed from its hub, reversed and placed back on the same side of the tractor thereby utilizing both sides of the teeth.

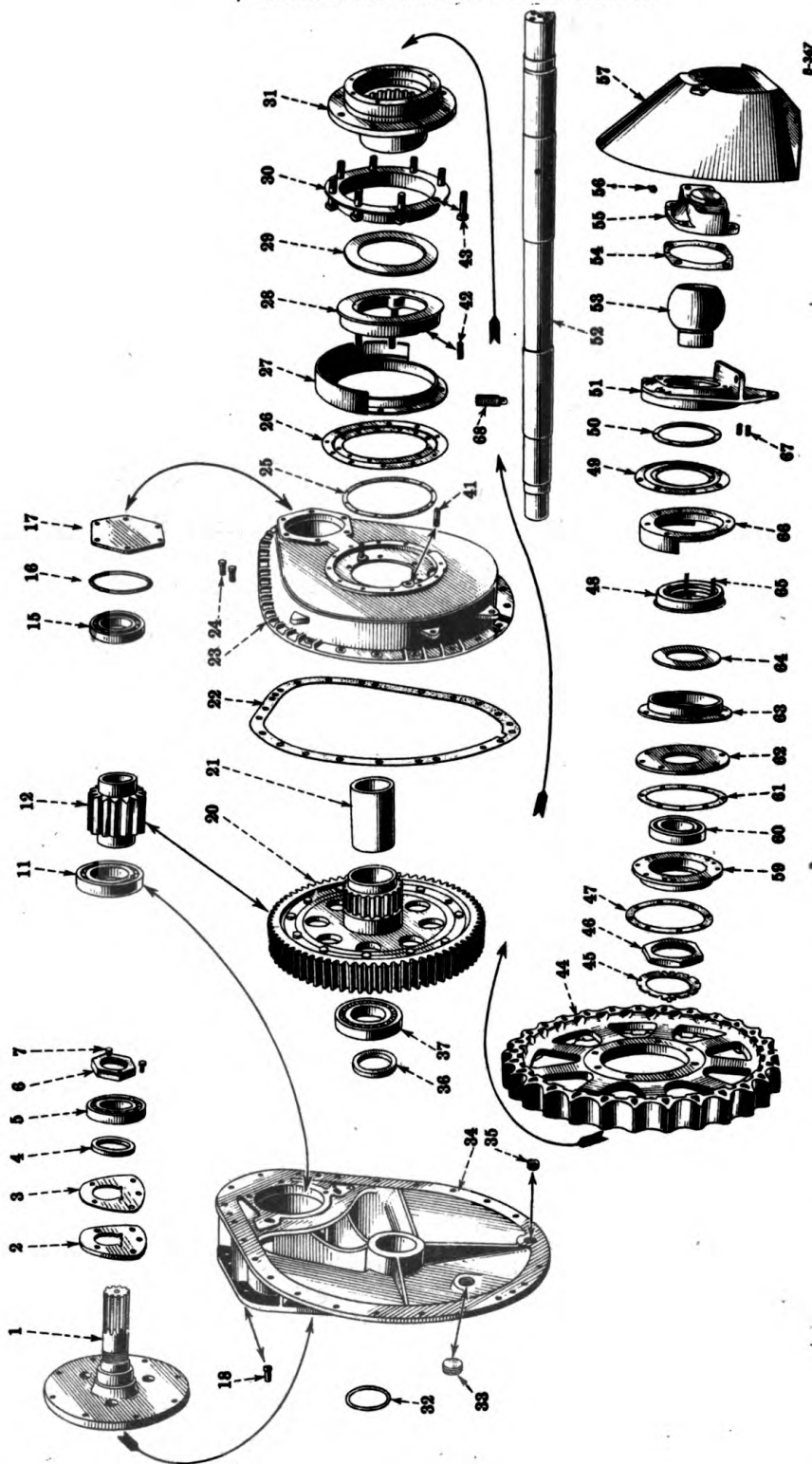
Removal of the Sprockets and Sprocket Drive

Lock the steering brakes and support the steering clutches when removing the sprocket drive parts. Take off the track chain, jack up the tractor, and remove the track frame. The track frame is freed at the front by putting a jack under the front stabilizer and raising it sufficiently to take the load off the equalizer spring. Remove the cap screws from the diagonal brace bearings at the pivot shaft.

Lift off the sprocket shield (57), *Illust. 2*, after the cap screws from the bracket (51) and bolts

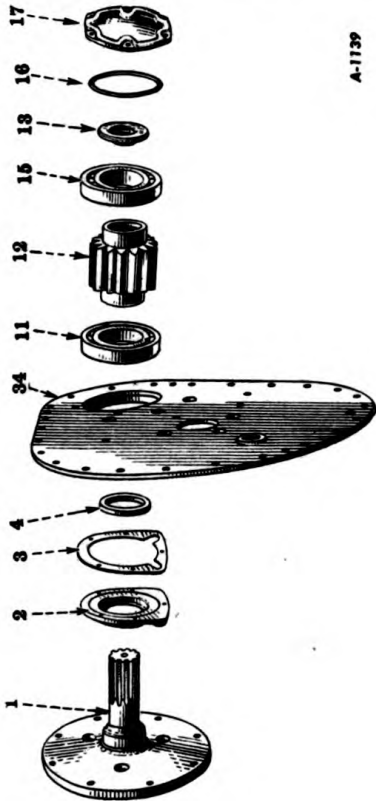
REPAIR SECTION

FINAL DRIVE - Continued



Illustr. 2
Exploded View of the Sprocket Drive Assembly

FINAL DRIVE - Continued



The illustration to the left applies to regular tread tractors only. Items with similar numbers shown above, as well as items 5, 6, 7 and 18, apply only to wide tread tractors.

A-1139

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Pinion shaft.	24	Dowel pin.	47	Gasket.
2	Bearing retainer with oil seal.	25	Retainer.	48	Pressure plate.
3	Bearing retainer gasket.	26	Diaphragm.	49	Diaphragm.
4	Oil seal.	27	Guard.	50	Retainer.
5	Bearing.	28	Pressure plate.	51	Bracket.
6	Bearing nut.	29	Packing.	52	Track frame pivot shaft.
7	Lock bolt.	30	Deflector.	53	Pivot bearing.
11	Bearing.	31	Carrier.	54	Gasket (track pivot),
12	Sprocket drive pinion (13 teeth).	32	Ring (track frame pivot shaft).	55	Cap (track pivot).
13	Washer (not illustrated).	33	Plug, 1-1/2".	56	Lubricator (track pivot).
15	Bearing.	34	Carrier with pipe plugs.	57	Shield (sprocket).
16	Packing ring.	35	Plug, 3/4".	59	Cage.
17	Cap with packing ring.	36	Spacer, short.	60	Bearing.
18	Pin.	37	Bearing.	61	Gasket.
20	Gear (68 teeth) and carrier.	41	Anchor pin.	62	Retainer.
21	Spacer, long.	42	Spring.	63	Deflector (track frame).
22	Gasket.	43	Bolt.	64	Packing.
23	Cover with anchor pins.	44	Sprocket (29 teeth).	65	Spring.
		45	Lock.	66	Guard.
		46	Nut.	67	Anchor pin.
				68	Pivot shaft set screw.

FINAL DRIVE - Continued

Removal of the Sprockets and Sprocket Drive - Continued

from the track frame have been removed. The track pivot cap (55) and gasket (54) come off after removing four capscrews.

Remove cap screws from the pivot bearing (53) and the pivot bracket (51). Jack up the rear of the tractor on the side being worked on. Slide off the pivot bearing (53) with the bracket (51) and items (48), (49), (50), (65), (66), and (67). The packing (64) may be lifted from the dirt deflector (63).

Remove the cap screws which hold the dirt deflector (63) to the bearing cage (59). Lift off the dirt deflector (63), the retainer (62), the gasket (61). Assemble puller cap screws to the bearing cage (59). Run up cap screws evenly and pull the bearing cage (59) with bearing (60) and gasket (47). Bend back nut lock (45) and unscrew the nut (46). The service tool SE-1184-2 fits the nut (46). The sprocket (44) with its carrier (31) and dirt deflector (30) can be pried from the splined hub of the gear (20).

If the gear cover (23) or the carrier (34) are to be removed, a different procedure is necessary for both regular and wide tread tractors. Refer to the heading concerning the tractor on which you are working.

Wide Tread TracTractors

Lift out the packing (29) and remove cap screws in the dirt deflector (27). This will allow the retainer (25), diaphragm (26), dirt deflector (27), pressure plate (28), and springs (42) to be removed as a unit. Remove cap screws in the cap (17) and lift it off.

Remove cap screws, bolts, and nuts around gear cover (23) and turn puller cap screws into the tapped holes provided. Pull the gear cover (23) with gasket (22) and dowels (24). Bearing (15) will come off with cover (23) as will possibly the pinion (12). If not, the pinion (12) with the bearing (11) can be pried from the carrier (34). The gear (20) may now be pried from the pivot shaft (52) with bearing (37) and spacer (21). The spacer (36) may now be slid from the pivot shaft.

To remove the carrier it will be necessary to take off the inspection covers on top of the main frame cover near the steering clutch release fork and support the steering clutches with a rope attached to a chain hoist. Now remove the lock bolts (7) from the bearing nut (6). Turn the nut off pinion shaft (1). Remove nuts and bolts from the carrier (34). Assemble puller cap screws, run them up evenly and pull the carrier from the main frame with oil seal retainer, gasket, oil seal (4) with bearing (5), and dowel pins (18). The ring (32) fitting in the groove in the main frame around the pivot shaft (52) may be removed.

Regular Tread TracTractors

Lift out the packing (29), *Illust. 2*, and remove cap screws in the dirt deflector (27). This will allow the retainer (25), diaphragm (26), dirt deflector (27), pressure plate (28), and springs (42) to be removed as a unit.

Remove capscrews from cap (17) and lift it off. Then remove cap screws and lift off the pinion bearing retainer. Remove cap screws, bolts, and nuts around the gear cover (23) and turn puller cap screws into the tapped holes provided. Pull the gear cover (23) with gasket (22) and dowels (24). The bearing (15)

FINAL DRIVE - Continued**Regular Tread TracTracTors - Continued**

will come out with cover (23). Pinion (12) may also come out with the cover. If it does not, the pinion (12) and bearing (11) can be pried from the carrier (34). The gear (20) can now be pried from the pivot shaft (52) along with bearing (37) and spacer (21). The short spacer (36) can be slid from the pivot shaft.

To remove the carrier plate (34), it will be necessary to remove the inspection covers on top of the main frame cover near the steering clutches, and to support the steering clutches with a rope attached to chain hoist. Remove the nuts and bolts from the carrier plate (34). Assemble puller cap screws, run them up evenly, and pull the carrier from the main frame with the oil seal retainer (2), gasket (3), oil seal (4), bearing (5), and dowel pins (18). The ring (32)

fitting in the groove in the main frame around the pivot shaft (52) can then be removed.

Replacement of the Sprocket Drives

To replace the sprocket drives the removal procedure can be reversed. The oil seal (4) should be placed in the oil seal cage so that the lip of the seal will face the pinion (12). When pressing the bearing cage (59), with the bearing (60), into the carrier (31), be sure to line up the cap screw holes in the bearing cage with those in the carrier.

When replacing diaphragm seals test the action of the seals first. Be sure the anchor pins (41) enter the holes in the pressure plate (28). Also be sure that the anchor pins (67) which go in the bracket (51) fit into the pressure plate (48).

REPAIR SECTION

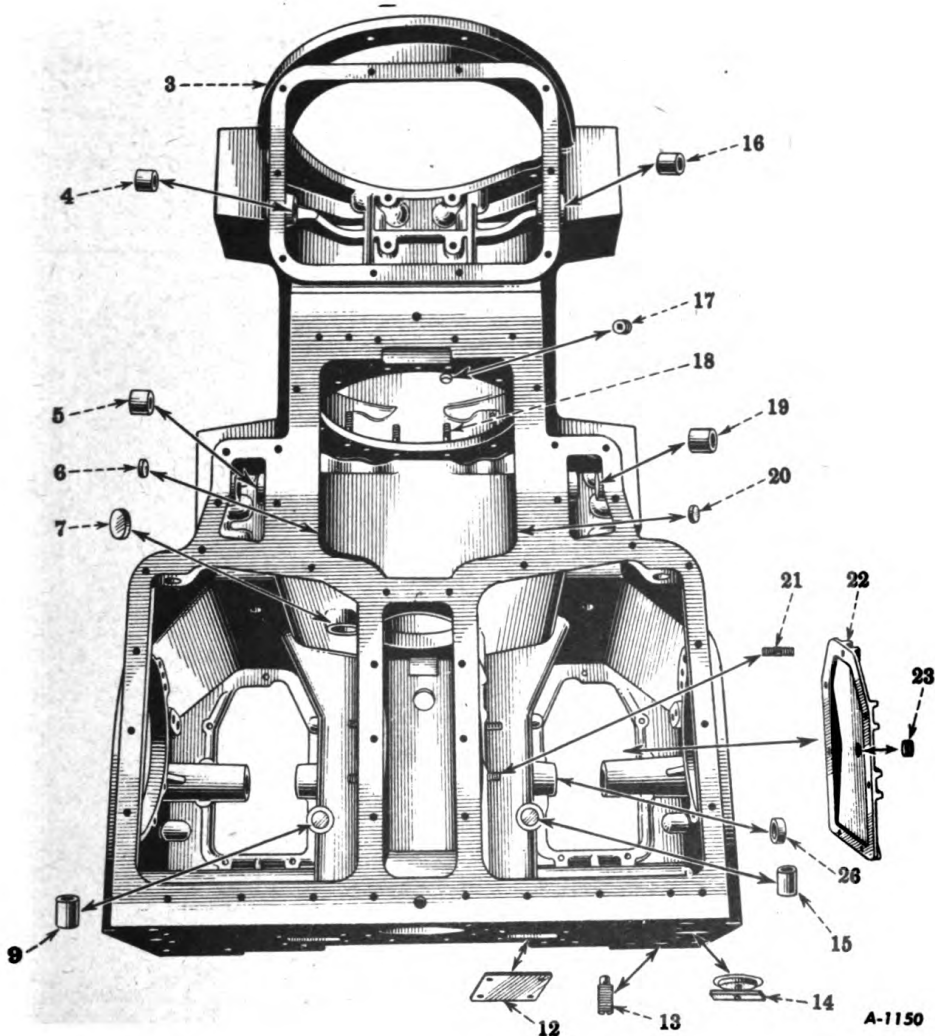
MEMORANDA

FRAME

Main Frame

A heavy reinforced casting houses the engine clutch, transmission, bevel gear and pinion, steering clutches, and steering brakes.

Heavy channels of steel are securely bolted to the main frame casting and tied in front by the heavy radiator base. This rugged foundation absorbs stresses and strains.



Illust. 1
Exploded View of the Main Frame.

REPAIR SECTION

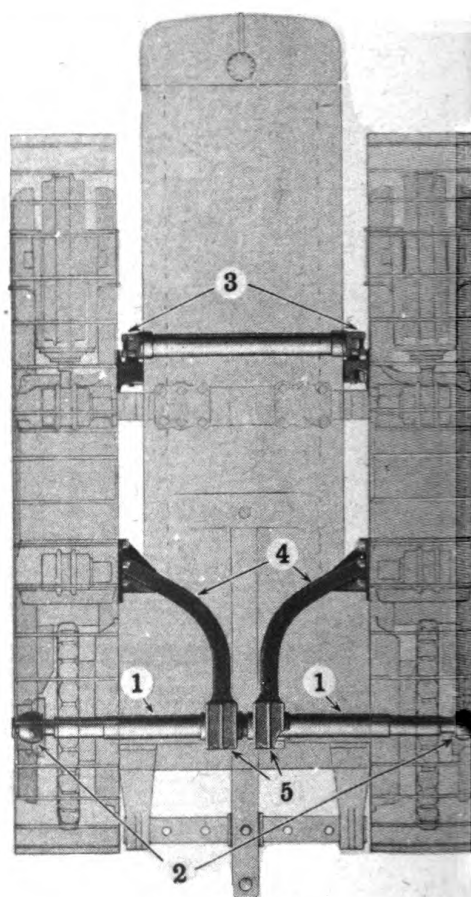
FRAME - Continued

Ref. No.	Description	Ref. No.	Description
3	Main frame.	16	Engine clutch release shaft bushing.
4	Engine clutch release shaft bushing.	17	Socket head pipe plug (magnetic).
5	Steering brake lever outer bushing.	18	Transmission end cover stud
6	Steering brake operating shaft plug.	19	Steering brake lever outer bushing.
7	Transmission reverse idler shaft plug.	20	Steering brake operating shaft plug.
9	Steering clutch release shaft bushing.	21	Bevel gear bearing cage stud.
12	Main frame rear inspection cover.	22	Steering brake inspection cover.
13	Track frame pivot shaft set screw.	23	Steering brake inspection cover drain plug.
14	Steering clutch lubricating port cover.	26	Steering brake pivot shaft cup plug.
15	Steering clutch release shaft bushing.		

Track Frame

The front idler, track idlers and track rollers are secured to the heavy welded-steel, channel-constructed track frames. They are pivoted by a ball and socket on the ends of the pivot shaft. Each track is free to oscillate vertically independent of one another. This prevents leverage strains being imposed on the pivot shaft (1), *Illust. 2*, due to the slight lateral deflection of the track frame. The equalizer spring contacts the track frame, and the roller-type stabilizers (3) maintain the track spacing (heavy braces and brackets attached to the main frame side channels carry the stabilizer rollers; roller guides are bolted to the track frame). Heavy steel diagonal braces (4) are bearing-mounted at the center of the pivot shaft. They keep the track frame in upright position but allow vertical oscillation.

Illust. 2 →
Track Stabilizer Construction -
1. Track Frame Pivot; 2. Ball-and-Socket Pivot Bearings; 3. Front Stabilizer; 4. Diagonal Braces; 5. Diagonal Brace Pivot Bearings.

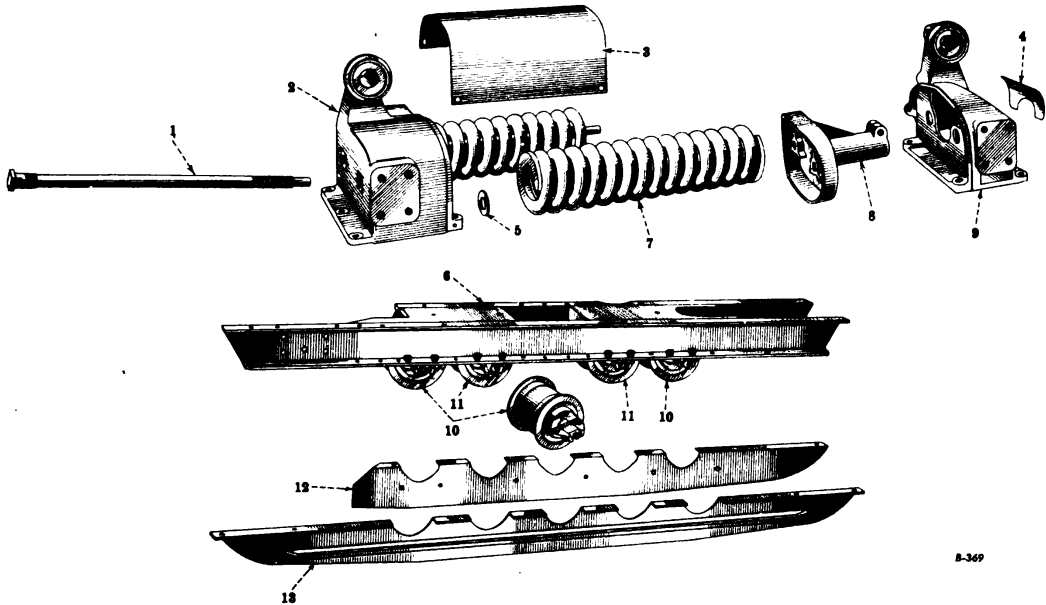


FRAME - Continued

Removal of the Track Frame

Take off the track chain, place a jack under the stabilizer brace and raise the front of the tractor enough to take the load of the equalizer spring from the track

frame. Take out the bolts in the roller guide, and put a jack under the drawbar. Then disconnect the diagonal brace at the pivot shaft. Take out the bolts in the sprocket shield and pivot bearing bracket. The frame can then be slid out of place.



Illustr. 3
Exploded View of Track Frame with Recoil Spring

Ref. No.	Description	Ref. No.	Description
1	Adjusting rod.	10	Track roller (single flange) with shaft and carrier (Nos. 1, 3 and 5).
2	Spring retainer, left hand.	11	Track roller (double flange) with shaft and carrier (Nos. 2 and 4).
3	Spring retainer, right hand.	12	Shield, inner, left hand.
4	Spring guard, left hand.	13	Shield, inner, right hand.
5	Spring guard, right hand.		Shield, outer, left hand.
6	Cover.		Shield, outer, right hand.
7	Lock washer.		
8	Frame, complete, left hand.		
9	Frame, complete, right hand.		
10	Spring.		
11	Retainer, front.		
12	Track idler support, front, left hand.		
13	Track idler support, front, right hand.		

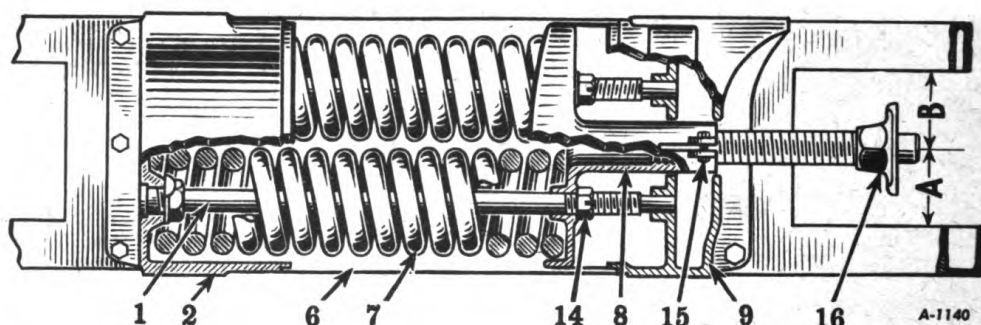
FRAME - Continued

Disassembly of the Track Frame

Remove the guard (3), *Illust. 3*. The outer (13) and inner (12) track shields can be taken off after the bolts have been removed from the frame (6). To release the track rollers (10) and (11) remove the bolts from the roller brackets. Jack up the nearest end of the track frame and lift the rollers out.

Remove the track front idler as outlined in Section XII. Then remove the cap screws from the cover plate (4) and take off the plate. After loosening the lock bolt in front of the spring retainer (8), unscrew the idler adjuster.

Remove the bolts from the spring guide (9) and the frame (6). The spring guide and the top idler can be slid forward and removed. Compression in the springs (7) can be relieved by unscrewing the nut from the end of the spring adjusting rod (1) after taking out the cotter keys. Unscrew each nut the same amount to relieve the compression evenly. The springs (7) can then be pulled off the spring adjusting rod (1). Remove cap screws from the retainer (2) and lift it off the frame (6). After bending back the lock washer (5) for the spring adjusting rod (1) and removing the lock nut, the rod can be slid out.



Illust. 4 - Cross Section of Front Track Idler Recoil Spring Assembly.
1. Spring Adjusting Rod; 2. Rear Spring Retainer; 6. Track Frame;
7. Recoil Spring; 8. Front Spring Retainer; 9. Recoil Spring Guide;
14. Castellated Nut; 15. Adjuster Rod Lock Bolt; 16. Idler Adjuster Rod.

Reassembly of the Track Frame

Place the rear retainer (2) on the frame (6) and run in the cap screws. Insert the spring adjusting rod (1) in the retainer (2). Place the lock washer on the rod and run up the lock nut. Then bend back the lock washer.

Slide the compression springs (7) over the spring adjusting rod.

Bring the front retainer (8) into position on the adjusting rod (1) and run up the nuts until the cotter keys can be placed through them and also through the adjusting rod. The nuts must be run up evenly to compress the spring (7) without danger of cocking the retainer (8) on the rods (1). The end of the retainer (8) should be centered between the channels of the track frame (6). (See A and B of *Illust. 4*.)

FRAME - Continued

Reassembly of the Track Frame - Continued

Place the spring guide (9) on the frame so that the adjusting rods (1) enter the two holes in the guide. Run in the idler adjuster. After final adjustment, the lock bolt in the front retainer (8) should be tightened. Adjust the nuts on the end of the rod (1) so that the idler adjuster is parallel with the frame (6). It should not be cocked to the side because this causes the tractor to creep to one side and increases track wear. Bend the cotter keys in the nuts and replace the cover plate (4).

Replace the five track rollers (10) and (11). Assemble the guard (3) to the spring guide (9) and the retainer (2). Then shields (12) and (13) can be secured to the frame.

Replacement on the Tractor

The track frame assembly is replaced on the tractor in the reverse order of removal.

Track Frame Pivot

A heavy pivot shaft (52), *Illust. 2*, Section V, extends through the rear of the tractor from track to track. The driving sprockets (44) revolve around the stationary axle. The track frames are mounted on this same axle through a ball and socket joint (51), (53), and (55), thus eliminating any twist or leverage loads at this point. Heavy steel diagonal braces bolted to the track frames are pivoted at midpoint of this shaft.

The pivot shaft needs replacement only in case of breakage. To remove the pivot shaft it is advisable to pull the pin from the front end of the drawbar and remove the cap screws from each diagonal brace at the pivot shaft. Jack up the tractor at the rear end, remove the sprocket drive gears and hous-

ing down to the main frame. Remove the diagonal brace bearings from the pivot shaft. Remove the drawbar braces. Remove the pivot shaft set screw (13), *Illust. 1*, and scrape the paint away from the pivot shaft at the center.

When replacing the pivot shaft, be sure to install new rubber rings between the main frame and the carrier casting.

Track Frame Guide

The track frame guides which maintain the track spacing consist of rollers (8), *Illust. 5*, attached to brackets (4) and (11) bolted to the main frame side channels (2) and (3), and the guides (5) attached to the recoil spring guides (9), *Illust. 3*. The bracket brace (10), *Illust. 5*, maintains the roller spacing.

To remove the track frame guide assembly, jack up the front of the tractor at the radiator. Then remove the bolts in the bracket brace (10), the brackets (4) and (11), and guides (5). Lift off the guides and drive the brackets off the dowel pins (1).

The rollers can be removed from the brackets by bending the cap screw lock (6), taking out the cap screws, and sliding off washers (7) and rollers (8).

Replacement of the guides is the reverse of removal.

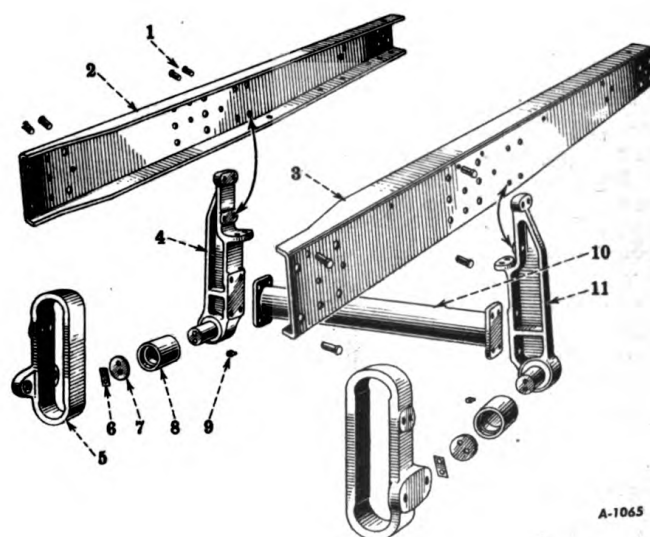
Track Frame Diagonal Brace

The diagonal brace (15), *Illust. 6*, keeps the tracks in vertical alignment and extends from a fixed position on the track frame to a pivot bearing on the pivot shaft at the center of the tractor.

This unit can be disassembled by removing nuts (16) from the studs (17) in the track frame. After

REPAIR SECTION

FRAME - Continued



Illustr. 5
Exploded View of Track Frame Guides.

Ref. No.	Description	Ref. No.	Description
1	Dowel.	7	Washer.
2	Channel, left hand.	8	Roller.
3	Channel, right hand.	9	Lubricator.
4	Bracket.	10	Bracket brace.
5	Guide.	11	Bracket, right hand.
6	Cap screw lock.		

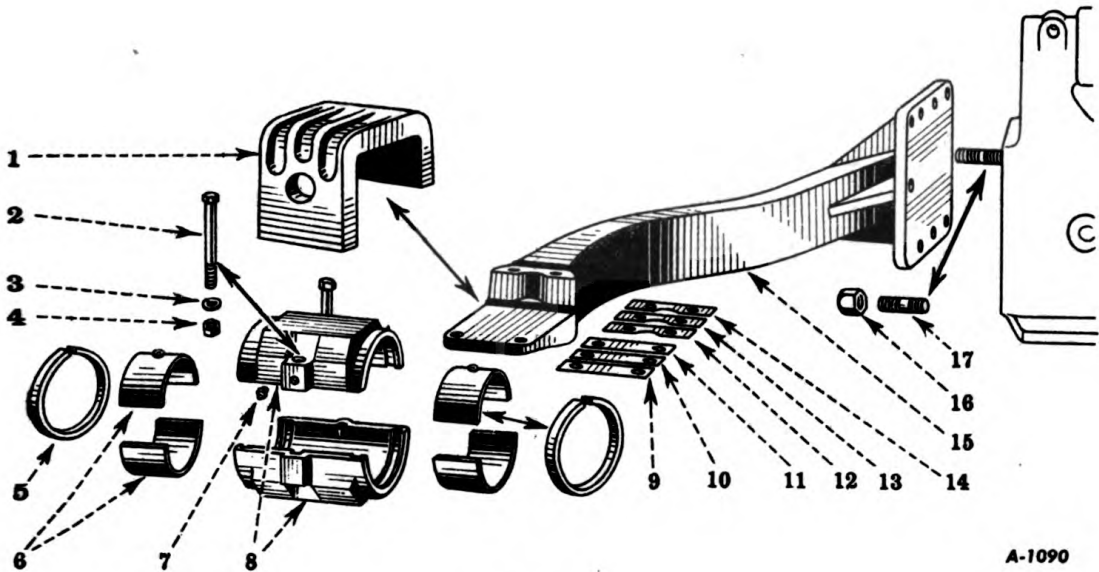
Track Frame Diagonal Brace - Continued

removing clamp (1), the brace (15) can be let down. When nut (4) is taken off, bolts (2) can be pulled out and bearing (8) slipped off. Felts (5) can be pulled out. Use new oil-soaked felts for replacement.

If the bushings (6) are only slightly worn, play can be removed by displacing the proper shims (9) to (12), (10) to (13), or (11) or (14). If replacement is desired, the bushings can be removed with a screw driver. They are replaceable, furnished to size.

Reassembly of the diagonal brace is the reverse of disassembly.

FRAME - Continued



A-1090

Illustr. 6
Exploded View of the Diagonal Brace.

Ref. No.	Description	Ref. No.	Description
1	Clamp.	10	Shim, outer - medium.
2	Cap screw, 1/2 x 3-1/2" N.F.	11	Shim, outer - light.
3	Lock washer.	12	Shim, inner - heavy.
4	Hex. nut, 1/2" N.F.	13	Shim, inner - medium.
5	Felt.	14	Shim, inner - light.
6	Bushing (set of 2).	15	Diagonal brace, left hand.
7	Lubricator.	16	Diagonal brace, right hand.
8	Bearing (set of 2).	17	Diagonal brace flange stud nut.
9	Shim, outer - heavy.		

Equalizer Spring

The equalizer spring is removed from the tractor by jacking up the front end of the tractor, removing the track frame from one side of the tractor, and running out dowel bolts from the lower frame pad (17), *Illustr. 7*. Be careful to support the spring in doing so because the pad is now free along with the entire equalizer spring

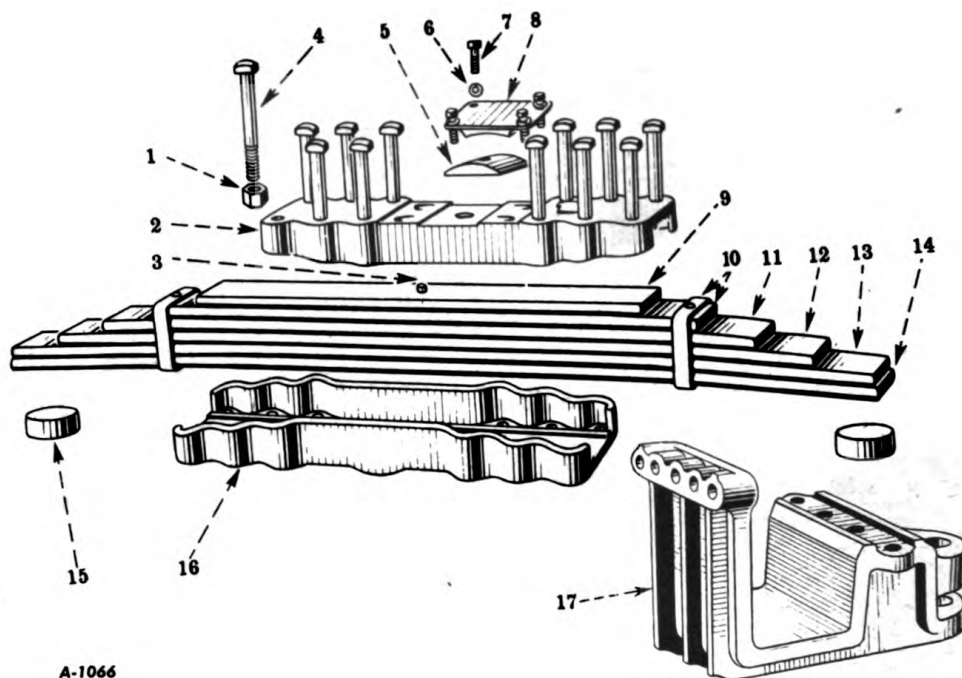
assembly. The entire assembly can be removed from the tractor.

Disassembly of the Equalizer Spring

Remove the bolts (4) from the upper (2) and lower (16) saddles. If necessary, the pad (5) can be disengaged from the upper saddle (2) by removing the rivets in the pad.

REPAIR SECTION

FRAME - Continued



A-1066

Illustr. 7
Exploded View of the Equalizer Spring.

Ref. No.	Description	Ref. No.	Description
1	Bolt nut	10	No. 5 leaf with clip.
2	Saddle, upper.	11	No. 4 leaf.
3	Center bolt.	12	No. 3 leaf.
4	Saddle bolt.	13	No. 2 leaf.
5	Wearing plate.	14	No. 1 leaf.
6	Lock washer, 9/16".	15	Guide pad.
7	Dowel bolt.	16	Saddle, lower.
8	Pad, upper.	17	Frame pad, lower.
9	No. 6 leaf.	18	Bumper pad bracket.

Disassembly of the Equalizer Spring - Continued

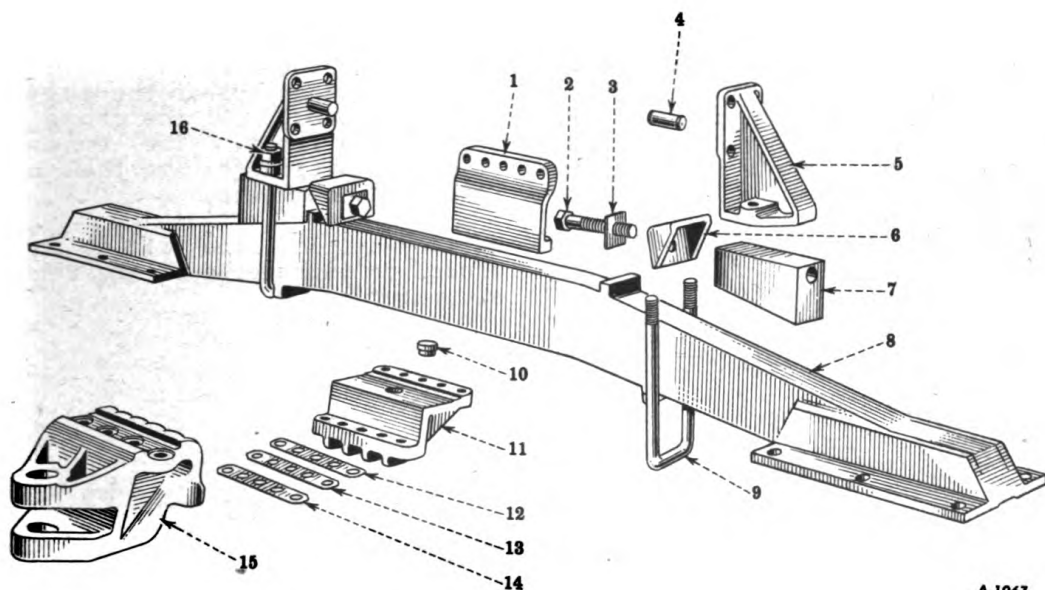
The top leaf can be lifted off when the center bolt (3) is taken out.

If it is necessary to replace damaged springs, remove clips on both ends of No. 5 leaf (10) thus freeing the rest of the leaves.

Reassembly of the Equalizer Spring

Reassembly is the reverse of disassembly. To facilitate reassembly, however, assemble all the leaves. Then replace the center bolt (3) to align the leaves. The upper pad (8) is attached to the bottom of the main frame with the special dowel bolts (7).

FRAME - Continued



Illust. 8
Exploded View of the Rigid Track Frame.

Ref. No.	Description	Ref. No.	Description
1	Clamp support.	9	Bracket "U" bolt.
2	Wedge bolt.	10	Dowel.
3	Wedge bolt lock.	11	Clamp.
4	Bracket dowel.	12	Shim, medium.
5	Bracket, left hand.	13	Shim, heavy.
6	Bracket, right hand.	14	Shim, extra heavy.
7	Wedge clamp.	15	Drawbar pivot bracket.
8	Rigid track frame cross bar, complete with angle brackets.	16	"U" bolt nut.

REPAIR SECTION

FRAME - Continued

Rigid Track Frame

(Used in place of Equalizer Spring, etc., when the TracTracTor is equipped with Cranes, Pipe Booms, and Similar Superimposed Equipment.)

The rigid track frame is a term used to specify the action of the track frame when the equalizer spring is replaced with a rigid cross bar. The removal procedure for this type of unit is similar to the removal of the equalizer spring.

Jack up the tractor at the front just enough to relieve the cross bar of the engine weight. Remove the track chain on both sides. Remove the front idlers and turn out the front idler adjusters. Take off the recoil spring guards (3), *Illust. 3*. Take out the bolts in the rear spring retainer (2) and

withdraw the spring retainer with the recoil spring assembly.

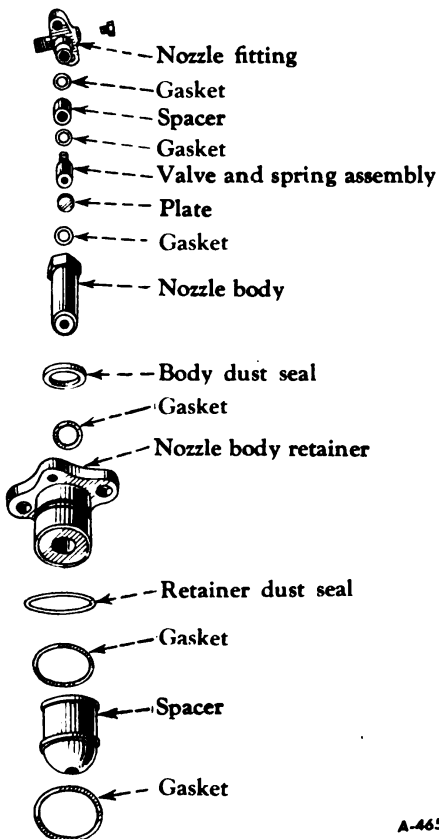
Take out bolts and lift off the recoil spring guides (9). Remove the bolts holding clamp support (1), *Illust. 8*, and clamp (11) to the main frame. Remove the nuts from the U-bolts (9). Jack up the front end some more so that the wedge clamps (6) clear the lugs on the cross bar. Pull the cross bar (8) out the front. The brackets (5) are doweled (4) to the main frame side channels.

Replacement of the rigid frame cross bar is reverse of the removal procedure.

FUEL SYSTEM

Injection Nozzles

The injection nozzle assembly consists principally of the nozzle, the nozzle body retainer, and the spacer or precombustion chamber. There are three copper gaskets inside the nozzle body. The first is below the nozzle plate, the second is between the spacer and the valve-and-valve-spring assembly, and the third is between the spacer and the nozzle fitting, (Illusts. 1 and 2). Use new gaskets if possible whenever servicing nozzle parts. Another copper gasket is located between the nozzle body and the retainer. Steel gaskets are located above and below the spacer.



Illust. 1
Exploded View of an
Injection Nozzle

A-465

Note: When replacing the nozzle body spacer be sure it is assembled with the word "UP" toward the top of the cylinder head.

The injection nozzles have a counterbore and a groove in the nozzle body retainers to accommodate dust seals. When assembling these seals, apply a light coating of potash soap solution to the seals. Roll it onto the nozzle body retainer and insert the assembly into the cylinder head bore. Tighten the nuts holding the nozzle body retainer to the cylinder head to 45 ft.-lbs. torque.

The injection nozzles can be readily removed by taking out two cap screws and disconnecting the fuel injection pump tubing. The assembly should be clean and free of carbon. To clean the nozzle, unscrew the nozzle fitting from the nozzle body. Check the length of the nozzle valve spring as it is assembled before dismantling. It will make reassembly to the proper tension much easier. The correct pressure of the assembled springs should be 34 to 35 lbs.

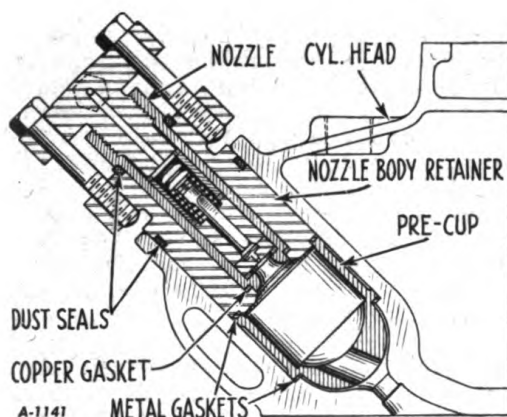
The nozzle should be checked with the hydraulic test pump SE-905-A for correct opening pressure as follows:

The leakage past the valve at 700 lbs. per sq. in. pressure should not exceed five drops per minute. The valve should be set to open at 700 lbs. per sq. in. pressure. Re-adjust the spring if necessary. Before testing the nozzle draw down the nozzle fitting to the nozzle body with a torque wrench to 90 ft.-lbs. torque. Cap screws holding the nozzle body and fitting in the nozzle body retainer should be drawn down to 20 ft.-lbs. torque.

If a smoky exhaust condition exists in one cylinder it can be traced by opening successively the fuel bleeder screw in each nozzle. The clearing of smoke on opening any one bleeder screw indicates a leaky

FUEL SYSTEM - Continued

Injection Nozzles - Continued



ILLUSTR. 2
Cross Section of an
Injection Nozzle

injector valve in that nozzle. This is particularly true of a light exhaust condition. Dirty nozzles and poor fuel will cause a light or dark blue smoke. The leaky nozzle valve, improper timing of the injector, poor fuel, and insufficient air are several of the causes for a heavy brown or black exhaust smoke. A knocking condition confined to one cylinder very often is caused by a leaky nozzle valve, a dirty fuel pump delivery valve, a broken delivery valve spring, sticky or warped intake or exhaust valves, and a leaky cylinder head gasket. Water in the fuel, sticky nozzle valves, or poor fuel will result in a general knocking condition of erratic or intermittent nature.

Fuel Injection Pump

The primary unit of the Diesel fuel injection system is a Bosch flange-mounted injection pump. It is a constant stroke, cam-actuated solid injection type equipped with a variable-stroke, self-regulating, plunger-type fuel supply pump. Fuel from the supply tank is pumped through an absorption-type metal and cloth element fuel filter. The injection pump operates at 1/2 engine speed. Air in the fuel system may be bled at the sediment bowl, fuel filters, and injection nozzles as described in the "Operations Section".

Whenever the high-pressure tubing is to be disconnected from the fuel injection pump, use two wrenches--one to loosen the pipe fitting and the other to prevent possible turning of the discharge fitting on the pump. Whenever the tubing has been removed place caps over the discharge fittings to prevent the possible entrance of dirt.

Removal and Replacement of the Injection Pump

Replacement and timing of the pump is outlined in the "Operation Section".

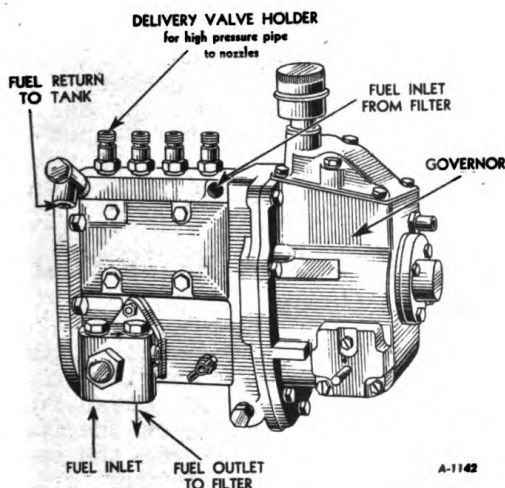
Refer to the "Adjusting Starting Control Mechanism," Section 10. If the engine does not come up to the proper high idle speed, remove the small cover adjacent to the governor control lever on the pump and adjust the rear set screw to give the speed desired. If the pump does not shut off by closing the throttle, adjust the front set screw to make it do so. Replace the cover and seal.

FUEL SYSTEM - Continued

Basic Tests and Adjustments of the Bosch Fuel Injection Pump

Fuel injection pumps removed from an engine, as well as those re-assembled after servicing, should be operated on a test bench such as the IHC SE-1247 test bench. Fundamentally, such a bench is a means of running the pump at normal operating speeds - with the tractor fuel piping duplicated and graduated containers to catch the fuel delivered from the injection nozzles.

The start of injection for each plunger, the pressure maintained by the fuel supply pump (6 to 8 lbs.), and the quantity of fuel delivered to each cylinder of the engine can be checked. Necessary adjustments can be made and the pump replaced on an engine with a minimum of lost time. Many pumps removed from engines require only retiming and recalibration.



Illust. 3
Bosch Fuel Injection Pump.

The test stand should be equipped to drive the injection pump at a speed of 550 R.P.M., and preferably another speed equivalent to the full load speed of the engine (1350 R.P.M. engine speed; 675 R.P.M. pump speed). In addition, the drive should include a disc graduated in degrees of a circle, and an adjustable pointer. A gauge rod graduated in millimeters or 64ths, attachable to the rear of the injection pump housing, and a pointer to match, attachable to the rear end of the control rod should be provided.

Timing the Bosch Fuel Injection Pump

For timing, attach the injection pump to a suitable bracket aligned with the drive. Thoroughly clean the exterior of the pump and remove the governor assembly as outlined under "Repair of the Bosch Fuel Injection Pump". Attach a fuel line from the source of fuel supply to the inlet fitting on the pump housing. Remove the delivery valve holder (2), *Illust. 5*, from the No. 1 injector, extract the delivery valve spring (3) and delivery valve (5), and replace the delivery valve holder. Move the control rod (45-B) so the mark on its underside at the rear is in line with the edge of the bushing. At this position, the split in the control sleeve toothed segments are straight out or perpendicular to the control rod.

Rotate the pump so the No. 1 injector starts to rise -- this can be determined by watching the tappet (71-A) through the inspection cover (38-A) opening. Turn on the fuel supply and carefully continue turning the pump camshaft until the flow of fuel from the delivery valve holder ceases. Set the indicator at zero on the graduated disc or at a recorded number of degrees on the disc. Turn the pump through a complete cycle and again check the position of the pointer on the indicator when the fuel

FUEL SYSTEM - Continued

Timing the Bosch Fuel Injection Pump - Continued

stops flowing from the delivery valve holder. Blowing the fuel from the depression in the top of the delivery valve holder will allow the exact position of fuel flow stoppage to be more clearly observed. The pump must be turned very slowly as this point is reached.

When the fuel stops flowing, the "SI" mark on the injection pump gear hub should line up with the "SI" mark on the face of the end plate (15). If the fuel does not stop flowing when these marks line up, the tappet adjusting screw (66) should be: (A) Raised to make the fuel stop flowing sooner, and (B) lowered to make the fuel stop flowing later. The pump turns in a clockwise direction when viewed from the front. The "SI" mark on the end cover is reached approximately 30° before the vertical center-line of the pump.

With the flow of fuel stopped at the time the "SI" marks on the hub and end cover line up (adjusted with the tappet screw for No. 1 cylinder), the delivery valve and spring may be replaced. The point at which the fuel stops flowing is called the start of injection and is abbreviated with the letters "SI". Remove the delivery valve for No. 3 plunger and turn the pump to make the fuel stop flowing from that delivery valve holder. The start of injection or stoppage of fuel flow for this plunger should occur exactly 90° of rotation after that for No. 1 plunger. If the fuel flow stops before 90° of turning has elapsed, the tappet adjusting screw for that plunger should be lowered. If the fuel flow stops after 90° of turning has elapsed, the tappet adjusting screw should be raised. When the tappet adjusting screw is set to make the fuel flow stop exactly 90° after that for No. 1 plunger, the delivery valve and spring may be replaced for this plunger.

Repeat this process for No. 4 plunger. The "SI" for this plunger should be exactly 90° after that for No. 3. When this has been properly adjusted, check the "SI" for plunger No. 2. It should likewise be 90° after that for No. 4. When this has been adjusted, see how many degrees of rotation are required to reach the "SI" for plunger No. 1, and see if this coincides with the "SI" marks on the end plate of the pump and pump gear hub. The "SI" for No. 1 should be 90° after that for plunger No. 2. This will be a check on the accuracy of your work. If these marks do not coincide after 90° rotation from the "SI" for plunger No. 2, the entire process must be gone over again, starting off with cylinder No. 1, and corrections made wherever necessary.

With each plunger properly timed for start of injection, "SI", turn the camshaft until plunger No. 1 rises as far as the cam will lift it. Lift the tappets with a screw driver to see if there is at least .020" vertical free travel of the plunger before it strikes the delivery valve seat. For accurately checking this free travel from the maximum lift position, a short rod of small diameter can be slipped down into the delivery valve holder until it contacts the top of the plunger (delivery valve removed). A dial indicator contacting the top of the rod will show the exact clearance between the top of the plunger and the delivery valve seat when the tappet is raised from the maximum lift position. Check each plunger for this minimum clearance.

Calibration of the Bosch Fuel Injection Pump

For calibration, the fuel piping for the pump should consist of a lead from a source of clean fuel to the forward fitting on the fuel supply pump. A pipe from the outlet fitting should include a 15-pound capacity pressure gauge and should lead to the inlet fitting at the rear of the injection pump

FUEL SYSTEM - Continued

Calibration of the Bosch Fuel Injection Pump - Continued

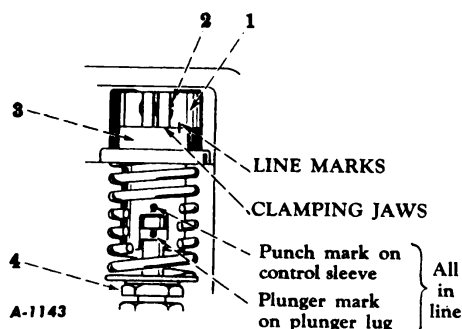
housing. A line for the return fuel should lead from the fitting at the front of the injection pump housing back to the original fuel supply container. The use of a filter in the outlet fuel line from the supply pump is recommended. Standard injection pipes and injection nozzles (set for 700 lbs.) are also necessary.

Run the pump to be sure that all air is bled out of the system. Bleed the air from the nozzles before making any quantity test. Attach a fixture to the pump and control rod and set the rod 6 mm. or 15/64" from the full stop position. Operate the pump for exactly four minutes at 550 R.P.M. The quantity of fuel delivered from each nozzle into the graduated beaker should be 136 cc. If this amount of fuel is not delivered from each nozzle, the following adjustments should be made:

- a. Move the control rod to the full stop position so that the clamping screw (2) *Illustr. 4*, in the jaw of the control segment is accessible.
- b. Loosen the clamping screw of the segment (1) for the plunger for which the quantity of fuel delivered was not correct.
- c. Facing the inspection cover opening, turn the control sleeve (3) to the right if fuel delivery was too low. Only a slight movement of the sleeve is required.
- d. If fuel delivery was too high, turn the control sleeve (3) to the left.
- e. Tighten each lock screw (2) that has been loosened.
- f. Take another test run of the pump with the control rod in exactly the same position as set for the initial test. If

the adjustment of the segments (1) was not satisfactory, repeat the foregoing steps until all are delivering the quantity required.

- g. The average delivery from the nozzles should be within 7 cc. of the amount specified. The maximum variation in the delivery of any nozzle from the average delivery for all nozzles should not exceed 5 cc.



Illustr. 4
Points of Adjustment for Timing and Calibrating Pump Plungers.

- (1) Toothed segment.
- (2) Clamping screw.
- (3) Control sleeve.
- (4) Tappet adjusting screw.

Move the control rod to a position 9 mm. or 23/64" from the full stop position. Repeat the test run outlined above. The quantity of fuel delivered from each nozzle should be 217 cc. If the control segments had to be readjusted to get the average fuel delivery from all nozzles within 11 cc. of the 217 cc. quantity, or within 9 cc. of one another, a re-run should be made at the 6 mm. or 15/64" setting of the control rod. The adjustment of the control segments should be balanced to give satisfactory fuel delivery at both the 6 mm. (15/64") and 9 mm. (23/64") setting of the control rod.

FUEL SYSTEM - Continued

Calibration of the Bosch Fuel Injection Pump - Continued

When pumps are tested prior to disassembly, and a pump cannot be made to deliver fuel within the limits specified, look for faulty delivery valve action, a faulty cam, and broken plunger springs, faulty test nozzles, or worn plungers. Switching of the test nozzles should not change the quantity of fuel delivered. If this does change the quantity of fuel delivered, the nozzles should be rechecked for uniform setting. If the pump delivers uniformly at these two settings, there is every assurance the engine will idle properly, and give smooth performance throughout the load range. This assumes the mechanical condition of the engine and the nozzles in the cylinder head are operating effectively.

Reassemble the governor to the pump. Operate the pump for exactly four minutes at 550 R.P.M. with the control lever held wide open. The quantity of fuel delivered, should be 268 cc. The maximum variation from the average of fuel delivered from any one nozzle should be 11 cc. and the average quantity of fuel should be within 13 cc. of the 268 cc. specified. If this amount is not delivered, remove the cover for the operating lever stops and adjust the forward stop screw to obtain this amount. Turning the screw in decreases the fuel delivery. Be sure to lock the screw after adjusting. This will be as close as the horsepower of the engine and maximum idle speed of the engine can be set by bench testing of the fuel pump.

Whenever a governor has been re-assembled and the setting of the stop plate (2), *Illust. 11*, is not known because new parts have been installed, it is necessary to operate the pump as closely as possible to the rated load speed or 675 R.P.M. of the pump. At this speed, the smoke limit cam (24),

Illust. 9, should just float against the rear corner of the step on the stop plate (2), *Illust. 11*. When set at the factory, the position of the parts is marked as indicated in *Illust. 11*. If the old parts are reinstalled, they can be made to line up with the scratch marks already inscribed. A straight edge against the forward step of the stop plate should show the alignment of the forward step of the stop plate with the scratch lines on the governor end cover. The scratch line on the smoke limit cam should line up with the mating mark on the fulcrum yoke lever. Where new parts are used, it may be necessary to reset both the cam and plate. If this is the case, eradicate the old scratch lines and add new lines at the new setting. Be sure the proper spring gap is used for the governor springs, as outlined under the "Governor Reassembly". The setting of the stop plate and the smoke limit cam have a definite effect on engine performance which can be checked after assembly of the pump to the engine.

Before attaching the inspection covers to the pump, inscribe a line on both the control sleeve toothed segment and the control sleeve of the plunger so that their position at the time of calibrating can be duplicated, should it become necessary to disassemble the pump again. Check all lock screws and adjustments for tightness before replacing the inspection covers. Be sure the pump is filled with the proper grade and amount of lubricating oil before testing.

The injection pump can now be replaced on the engine and timed. If the high idle speed of the engine is not 1500 R.P.M., adjustment of the forward stop screw for the control lever will give the speed desired. Readjust the control mechanism as outlined in the "Starting System", Section 10. If the engine smokes excessively under

FUEL SYSTEM - Continued**Calibration of the Bosch Fuel Injection Pump - Continued**

load, check the timing for the best position. If it continues, and all other items of the system have been checked, the stop plate and the smoke limit cam may have to be readjusted. If the smoking condition of the engine is satisfactory, but apparently there is insufficient power for overload or lugging ability, a slight adjustment of the plate or cam may be necessary. The setting of the cam and plate can only be made accurately when the engine is tested with a dynamometer where it can be given the rated load and overload. Be sure to check all other possible parts of the engine and pump which might contribute to faulty operation, before attempting to set these parts.

Repair of the Bosch Fuel Injection Pump

If it ever becomes necessary to adjust or disassemble the fuel injection equipment, it is of utmost importance that cleanliness be practiced. Should any dust, grit, water, etc., reach the working parts of the injection pump, serious damage will result that may make costly shut-downs and repairs necessary. Only after its accessories have been washed thoroughly with clean Diesel fuel to eliminate entirely any dirt or dust, should disassembly of the equipment be attempted.

Repair of the injection pump is divided into three main units: The injection pump housing assembly; the supply pump assembly; the governor assembly.

With the complete injection pump removed from the engine, or while it is assembled to the engine, the fuel supply pump may be replaced after taking off the three nuts holding the unit to the studs 59-A, *Illust. 5*. Pull on the fuel supply pump housing 15-A, *Illust. 8*, to remove it. Be sure to use a good gasket (16) when replacing the fuel supply pump.

With the injection pump removed from the engine as indicated in the procedure for this operation given in the Operations Section, the governor and pump housing assemblies can be separated. After removing the nine cap screws joining the governor end cover (38) *Illust. 9*, to the pump housing (62), *Illust. 5*, pull the cover to the rear until the dowels are free from the housing. Then slide the cover to the side to disengage the control rod linkage pin (27), *Illust. 9*, from the control rod (45-B), *Illust. 5*. Disassembly of each unit can now be performed independently of any other unit.

Disassembly of the Pump Housing Assembly

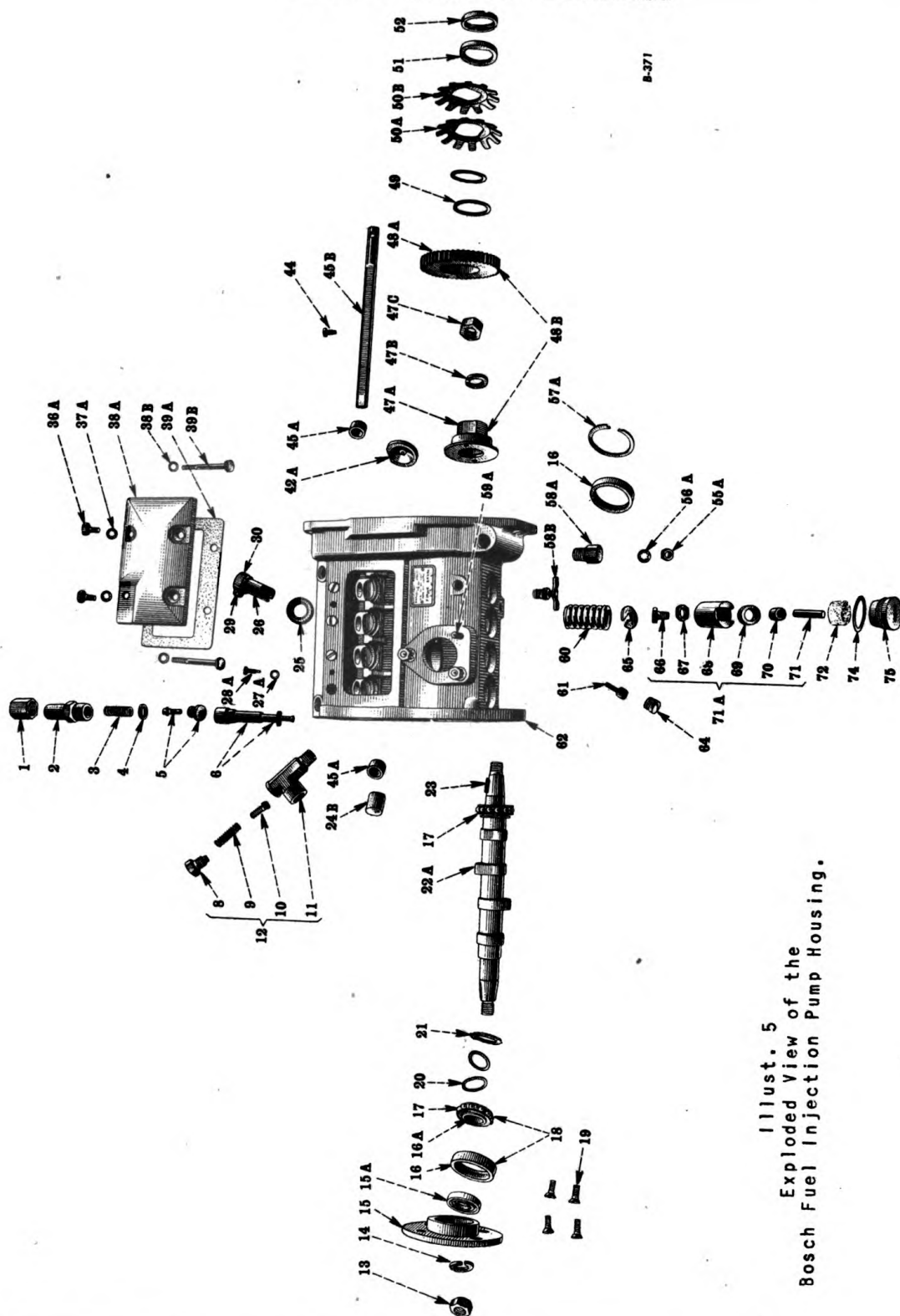
Remove the inspection cover (38-A), *Illust. 5*, the four barrel set screws (28-A) from the above inspection opening, the control rod securing screw (44) from the back side of the pump, the four closing plugs (75) in the base of the pump, and the overflow valve (12). Wrench SE-1296 is made to fit the slot in these plugs. A similar tool can be made from a drag-link screw driver rounded to fit the 3/4" radius at the base of the slot.

Set the pump gear hub in a vise and remove the governor drive gear hub nut (47-C). Bend back lock (51) and remove the gear adjusting nut (52) (service tool SE-1302). Lift off the lock, the two drive gear spring discs (50-A) and (50-B), the adjusting spacers (49), and the governor drive gear (48-A). Use puller SE-1303 to remove the gear hub (47-A) (with gear (48-A) in place) or turn the adjusting nut (52) on a few turns and pry the hub off, using a screw driver on each side under the nut while tapping on the end of the camshaft (22-A). Remove the key (23).

Remove the lubricating oil overflow tube with plug (61) from the base of the housing (62). Turn over the pump camshaft and place tappet holders (SE-1308), or their equivalent, between each tappet

REPAIR SECTION

FUEL SYSTEM - Continued



Illustr. 5
Exploded View of the
Bosch Fuel Injection Pump Housing.

FUEL SYSTEM - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Delivery valve holder protection cap.	21	Camshaft oil thrower.	49	Adjusting spacer, .020".
2	Delivery valve holder.	22A	Camshaft.		Adjusting spacer, .035".
3	Delivery valve spring.	23	Camshaft key.		Adjusting spacer, .049".
4	Delivery valve holder gasket.	24B	Control rod protection cover.	50A	Adjusting spacer, .065".
5	Delivery valve and seat.	25	Plunger spring seat, upper.		Drive gear spring disc, inner.
6	Plunger and barrel.	26	Control sleeve.	50B	Drive gear spring disc, outer.
8	Valve screw.	27A	Barrel set screw gasket.	51	Drive gear adjusting nut
9	Valve spring.	28A	Barrel set screw.		lock washer.
10	Valve proper.	29	Toothed segment clamping screw.	52	Gear adjusting nut.
11	Valve body.	30	Toothed segment.	55A	Hex. nut, 1/4" N.C.
12	Overflow valve.	36A	Inspection cover fastening screw, short.	56A	Fuel supply pump housing lock washer.
13	Camshaft hex. nut.	37A	Inspection cover fastening screw lock washer.	57A	Bearing retainer ring.
14	Lockwasher.	38A	Inspection cover.	58A	Lubricating oil drain plug.
15	End plate with oil seal.	38B	Inspection cover fastening screw long gasket.	58B	Lubricating oil level cock.
15A	End plate oil seal.	39A	Inspection cover fastening screw, long.	59A	Fuel supply pump stud.
16	Camshaft bearing, outer race.	39B	Inspection cover fastening screw, long.	60	Plunger spring.
16A	Camshaft bearing, inner race.	42A	Pump housing baffle with button.	61	Lubricating oil overflow tube with plug.
17	Camshaft bearing retainer with balls.	44	Control rod securing screw.	62	Pump housing.
18	Camshaft bearing, L.H. and R.H.	45A	Control rod bushing.	65	Plunger spring seat, lower.
19	End plate fastening screw.	45B	Control rod.	66	Tappet screw.
	Bearing adjusting washer, o. 1M/M.	47A	Drive gear hub.	67	Tappet screw lock nut.
	Bearing adjusting washer, o. 2M/M.	47B	Lockwasher.	68	Tappet shell with insert.
20	Bearing adjusting washer, o. 3M/M.	47C	Drive gear hub nut.	69	Tappet roller.
		48A	Drive gear.	70	Tappet roller bushing.
		48B	Drive gear.	71	Tappet pin.
				71A	Tappet.
				72	Felt cushion.
				74	Closing plug gasket.
				75	Closing plug.

FUEL SYSTEM - Continued

Disassembly of the Pump Housing Assembly - Continued

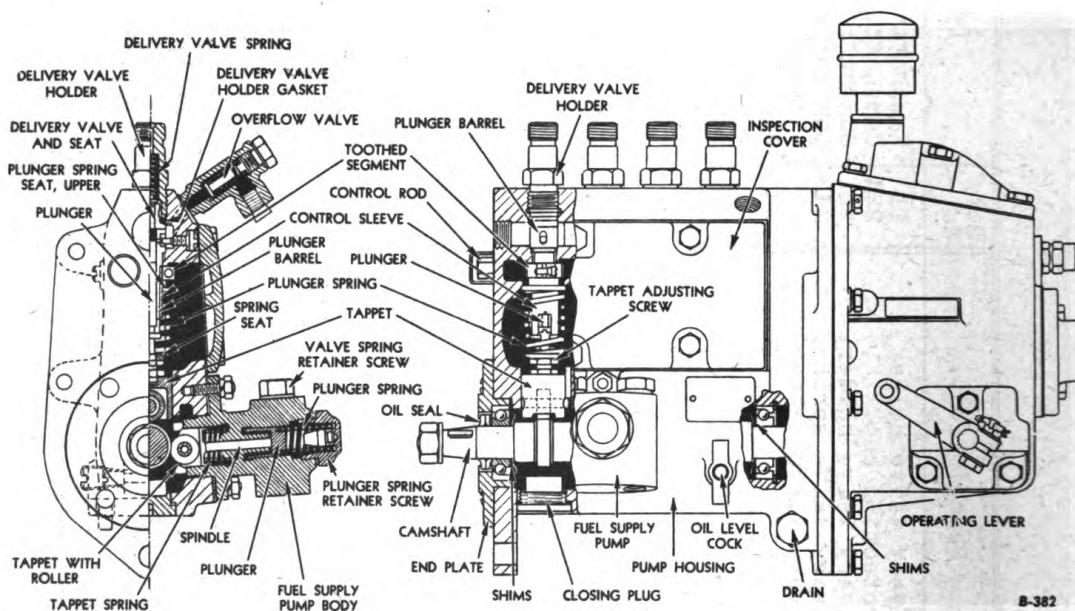
screw (66) and its lock nut (67). Remove the pump gear hub, the key in the camshaft, and then take off the end plate (15) with its oil seal (15-A), and the bearing outer race (16). The camshaft assembly can now be removed from the housing. Use a bearing race puller (SE-1300) to remove the bearing race (16-A) from the camshaft (22-A).

The complete tappets (71-A) can now be removed from the housing. The plunger (6), the lower spring seat (65), and the plunger spring (60) can all be removed through the holes in the base of the pump housing. The upper spring seat (25) and the control sleeve (26) with toothed segment (30) can now be removed through the inspection cover opening.

Remove the delivery valve holder (2) for the same plunger and lift out of the spring (3) and delivery valve (5). Use a block of wood and drive the plunger barrel (6) out of the housing with the delivery valve seat (5) and gasket (4). Flush the barrel and plunger with clean oil and slide the plunger within the barrel. Keep all the parts for this cylinder together before repeating the process for the other cylinders.

Repair of the Pump Housing Assembly

All parts should be carefully washed in clean Diesel fuel and blown dry with compressed air (free from water or dirt). Exceptionally dirty parts should be cleaned in paint removed. Gummed or sticky plungers should be soaked in acetone.



Illustr. 6
Cross Section of the Bosch Fuel Injection Pump.

FUEL SYSTEM - Continued

Repair of the Pump Housing Assembly - Continued

If wear is excessive, the bushings (45-A), *Illust. 5*, may be replaced. They must be line-reamed to a dimension of .4331" to .4338". Clearance between the shaft should be from .0015" to .0027".

When replacing the outer bearing race (16), replace also the inner bearing race (16-A) and bearing (17). The end play of the camshaft (22A) when assembled complete is .004" to .008". The lip of the oil seal (15-A) faces the interior of the pump housing (62).

The plunger and barrel (6) should be carefully inspected for wear. If the plunger has lost its mirror-like appearance and looks dull or grey, it is a sure indication that the plunger has been worn due to dirt in the fuel. The edge of the plunger helix should appear sharp under a magnifying glass and the plunger should not be nicked or scratched. The upper portion of a badly worn plunger is magnified many times in *Illust. 8*. If there is some doubt as to whether it is

necessary to replace the plunger, assemble the pump and test it as outlined under the "Basic Tests and Adjustments" heading. Wipe the plunger only with cleansing tissue, never handle the polished surface with bare fingers.

Always use a new delivery valve gasket (4) *Illust. 5*. The delivery valve (5) should fall freely in its seat with both parts lubricated.

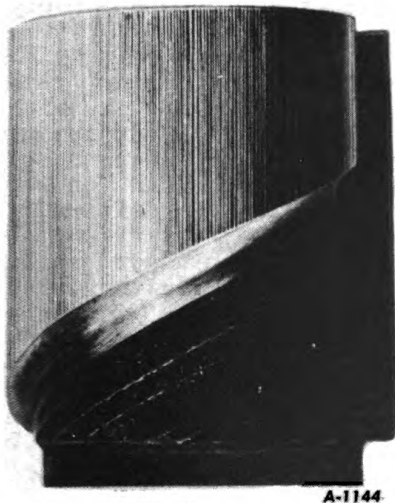
The toothed segment (30) should never be moved on the control sleeve (26) unless either are to be replaced. The scratch mark on both parts should line up. If the guide slots are badly worn, replace the sleeve. When assembling new parts, line up the gap in the segment with the slots in the segment for the initial setting. Change the setting as explained under "Basic Tests and Adjustments".

Reassembly of the Pump Housing Assembly

When reassembling plunger units in the pump housing, complete all the operations for any one cylinder before proceeding to the next. It is absolutely essential that each plunger (6) *Illust. 5*, is replaced in the barrel from which it is removed. Lubricate the plunger before inserting in the barrel.

Separate the plunger and barrel (6). Insert the barrel in the pump with the long slot in the top of the barrel facing the inspection cover side of the pump. Screw in the barrel set screw (28-A) with its gasket (27-A). Assemble the delivery valve and seat (5), followed by gasket (4), spring (3), and delivery valve holder (2). Tighten the delivery valve holder to 35 ft.-lbs. torque. Place a cap (1) over the holder.

Replace the control rod (45-B) and turn in its securing screw (44) with the long end to the rear. Insert the control sleeve (26) and toothed segment (30) through the inspection cover opening and slide



Illust. 7
Picture of a Badly
Worn Plunger.

FUEL SYSTEM - Continued

Reassembly of the Pump Housing Assembly - Continued

the unit over the end of the plunger barrel. Move the control rod to a point where the spot on the round surface near the rear of the rod is flush with the inside surface of the housing. Raise the control sleeve (26) and segment (30) to engage the teeth on the control rod so that the split in the segment (30) faces directly out, perpendicular to the control rod. Slide the upper plunger spring seat in place with the groove toward the spring.

Insert the plunger spring over the sleeve from the bottom. Dip plunger (6) in clean Diesel fuel and use service tool SE-1298 or its equivalent to gently insert the plunger (6) in its barrel. Be sure the flange on the plunger with the punch mark freely enters the slot of the sleeve (26) which has a similar mark, *Illust. 4*. Withdraw the plunger slightly and attach the lower plunger spring seat. Be sure the recess in the seat is toward the bottom. Assemble the tappet (71-A), *Illust. 5*, and insert it into the bore in the pump housing. The pin (71) engages a slot in the housing and prevents the tappet from turning. Push the tappet toward the top of the pump housing, engage the flange on the plunger in the control sleeve slot, and slip the tappet lifter SE-1308 between the tappet screw (66) and its lock nut. Move the control rack back and forth to check the free movement of the parts.

Repeat the foregoing process to replace all assemblies for each cylinder. Check after each installation for freedom of parts. Remove any assembly that causes difficulty before proceeding further.

Replace the rear bearing race (16) in the pump housing (62). Also replace the forward bearing race (16) in the end plate (15) after the oil seal (15-A) is in place

with the lip facing the bearing. Assemble the camshaft to the housing and fasten the end plate. Check the end play of the camshaft. Arrange shims (20) for end clearance of .004" to .008", preferably .004". Tappet holders can now be removed. *Follow the procedure outlined under "Basic Tests and Adjustments".*

Replace key (23). Set the drive gear hub (47-A) in the gear (48-A) and assemble both to the camshaft. Tighten nut (47-C). Assemble adjusting spacers (49), spring discs (50-A) and (50-B), lock washer (51), and gear adjusting nut (52). The spacers (49) are furnished in various thicknesses, namely .035", .049", .065". Use one or more spacers, as required, so that 3 to 3-1/4 ft.-lbs. torque are required to turn the gear (48-A) when the nut (52) is drawn tight. Lock the lock washer (51) against the nut (52).

If only the pump housing has been repaired, assembly of the supply pump and governor can be completed, the pump set for approximate full load delivery as outlined under the "Calibration" heading, and the unit reassembled to the engine. Retime for best operation as outlined in the Operations Section.

Disassembly of the Supply Pump

Remove the valve spring retaining screws (10), *Illust. 8*, with gasket (9), and lift out springs (8) and valves (7). Keep these parts in order so they can be replaced in their original position.

Take off the plunger spring retainer screw (11) with gasket (12), and lift out spring (13) and plunger (14). Remove from the housing (15-A) the tappet-securing pin (1), and slide out the tappet assembly (1), (2), (3), and (4). Spring (5) and spindle (6) can then be removed.

Removing the tappet wrist pin (2) from the tappet shell (4) releases the tappet roller (3).

FUEL SYSTEM - Continued

Repair of the Supply Pump

Flush all parts with clean Diesel fuel. Examine all valve seats and the ends of the valves. If the ends of the valves are not smooth they may be refinished in a speed lathe. The spindle (6) is a lapped fit in the housing (15-A); replace the spindle if it is worn excessively.

Reassembly of the Supply Pump

Reassembly of the supply pump is the reverse of the disassembly procedure.

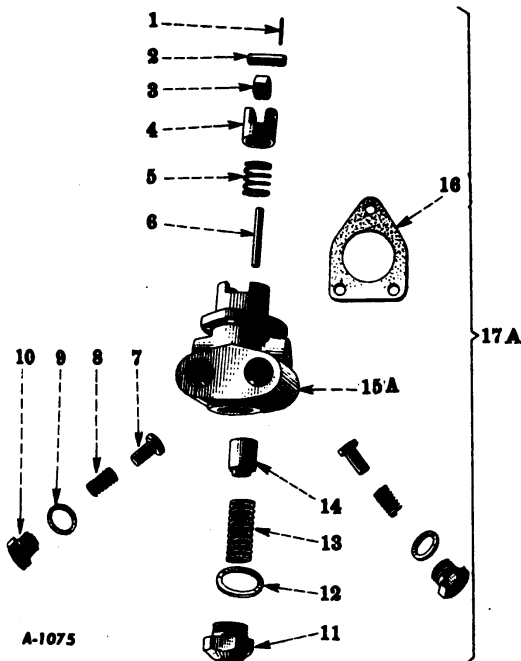
Be sure all parts are clean before proceeding. If the supply pump will not prime after reinstalling it, remove the inlet screw (10), put in a few drops of lubricating oil, and replace the screw. With

the overflow valve on the pump functioning properly, the supply pump should maintain 6 to 8 lbs. of fuel pressure in the pump housing sump. The free length of the overflow valve spring (9), *Illust. 5*, is $5/8"$.

Disassembly and Repair of the Governor

Remove the governor inspection cover (53), *Illust. 9*. Take off the upper and lower operating stop covers (88) and (89). Take out the four spring cap screws and remove the retainer end cap (65). After turning off the bearing nut (37), the bearing (35), outer and inner governor spring spacers (79) to (84), the outer and inner governor springs (33) and (32) can then be slipped out. Removing the cap screws (15) from the bearing support plate (10) permits the governor weight and shaft assembly (18), complete to be pulled from the end cover (38). The sleeve (19) with the bushing and thrust bearing can now be slipped from the pegs of the fulcrum lever (20) for removal.

(Continued on page 16)

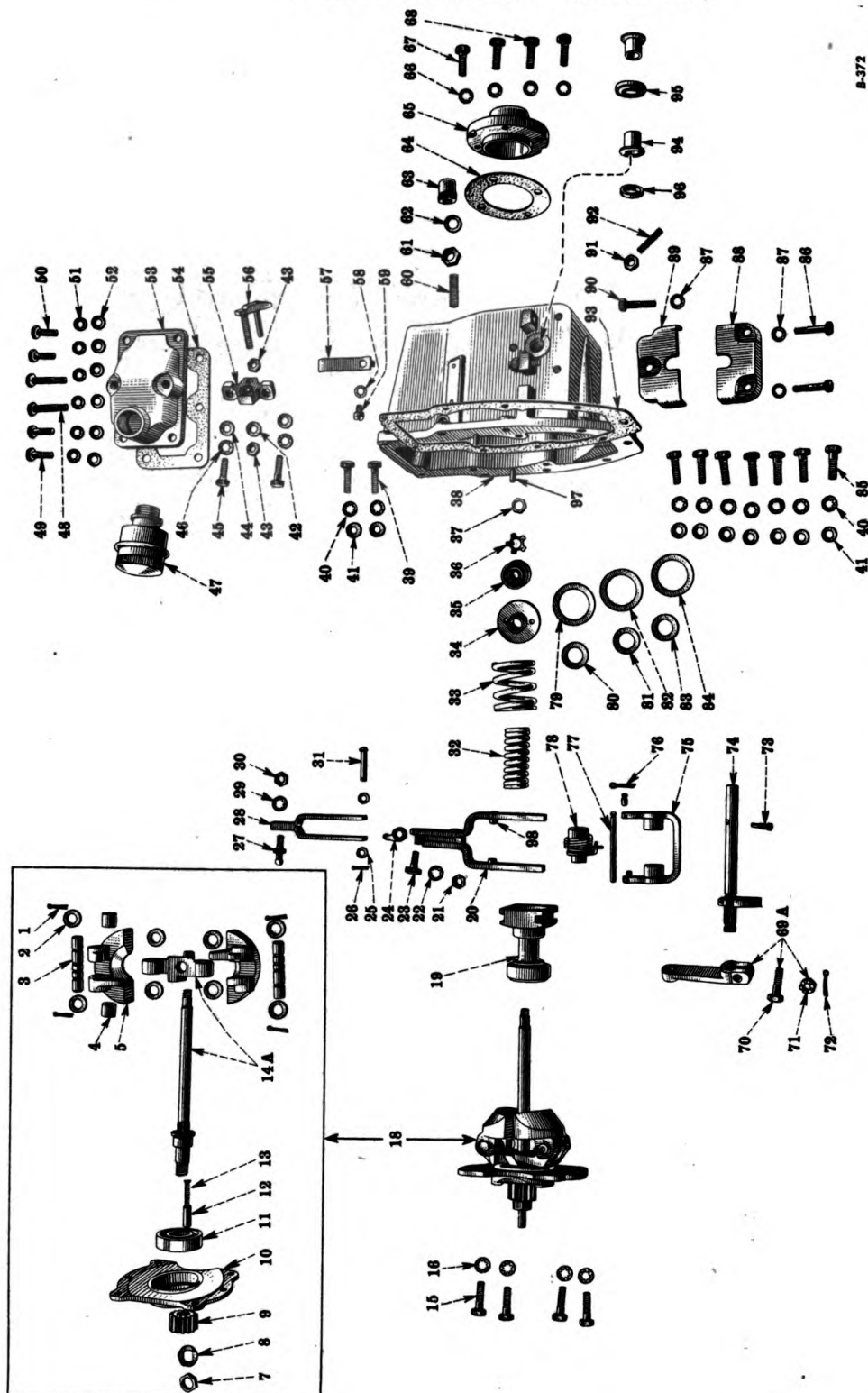


Illust. 8
Exploded View of the
Fuel Supply Pump.

Ref. No.	Description
1	Tappet securing pin.
2	Tappet wrist pin.
3	Tappet roller.
4	Tappet shell.
5	Tappet spring.
6	Spindle.
7	Valve, inlet and outlet.
8	Valve spring.
9	Valve spring retainer screw gasket.
10	Valve spring retainer screw.
11	Plunger spring retainer screw.
12	Plunger spring retainer screw gasket.
13	Plunger spring.
14	Plunger.
15A	Fuel supply pump housing.
16	Fuel supply pump housing gasket.
17A	Fuel supply pump, complete.

REPAIR SECTION

FUEL SYSTEM - Continued



Illustr. 9
Exploded View of the Governor.

B-372

FUEL SYSTEM - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Cotter pin.	36	Governor weight shaft bearing lock washer.	68	Spring retainer end cap bolt, lower.
2	Governor weight washer.	37	Governor weight shaft bearing nut.	69A	Operating lever.
3	Governor weight pin.	38	Governor end cover.	70	Operating lever bolt.
4	Governor weight bushing.	39	Governor end cover bolt.	71	Operating lever bolt nut.
5	Governor weight.	40	Governor end cover bolt lock washer.	72	Cotter pin.
7	Governor driven gear nut.	41	Governor end cover bolt washer.	73	Spring plate set screw.
8	Governor driven gear lock washer.	42	Stop plate screw washer.	74	Operating lever shaft.
9	Governor driven gear.	43	Hex. jam nut.	75	Fulcrum lever bracket.
10	Bearing support plate with cage.	44	Stop plate bridge bolt washer.	76	Cotter pin.
11	Governor weight shaft bearing (drive end).	45	Stop plate bridge bolt.	77	Fulcrum lever bracket pin.
12	Governor shaft plunger oiler.	46	Stop plate bridge lock washer.	78	Operating shaft plate.
13	Governor shaft plunger oiler spring.	47	Breather.	79	Outer spring spacer, .020".
14A	Governor weight shaft and spider.	48	Governor inspection cover bolt, center.	80	Inner spring spacer, .020".
....	Cotter pin.	49	Governor inspection cover bolt.	81	Inner spring spacer, .042".
15	Bearing support plate bolt.	50	Governor inspection cover bolt, short.	82	Outer spring spacer, .042".
16	Bearing support plate bolt lock washer.	51	Governor inspection cover bolt lock washer.	83	Inner spring spacer, .058".
18	Governor weight and shaft.	52	Governor inspection cover bolt washer.	84	Outer spring spacer, .083".
19	Sleeve with bushing and thrust bearing.	53	Governor inspection cover with baffle.	85	Outer spring spacer, .083".
20	Fulcrum lever.	54	Governor end cover gasket.	86	Governor end cover bolt, long.
21	Hex. jam nut.	55	Stop plate bridge.	87	Operating lever stop cover lower bolt.
22	Smoke limit cam screw lock washer.	56	Stop plate (end cover housing).	88	Operating lever stop cover lock washer.
23	Smoke limit cam screw (fulcrum lever).	57	Bumper spring.	89	Operating lever stop cover, lower.
24	Smoke limit cam.	58	Bumper spring lock washer.	90	Operating lever stop cover, upper.
25	Control rod link pin washer.	59	Screw.	91	Operating lever stop cover upper bolt.
26	Cotter pin.	60	Bumper spring adjusting screw.	92	Hex. nut.
27	Control rod linkage pin.	61	Hex. nut.	93	Set screw.
28	Control rod link.	62	Bumper spring cap gasket.	94	Governor end cover gasket.
29	Control rod linkage pin lock washer.	63	Bumper spring cap.	95	Operating lever shaft bushing.
30	Hex. nut.	64	Spring retainer end cap gasket.	96	Plug (for operating lever shaft hole).
31	Control rod link pin.	65	Spring retainer end cap.	97	Bearing support plate dowel.
32	Governor spring, inner.	66	Spring retainer end cap bolt lock washer.	98	Fulcrum lever pivot pin.
33	Governor spring, outer.	67	Spring retainer end cap bolt, upper.		
34	Spring seat.				
35	Governor weight shaft bearing (spring end).				

REPAIR SECTION

FUEL SYSTEM - Continued

Disassembly and Repair of the Governor - Continued

If there is excessive play between the fulcrum lever assembly (20) and the bracket pin (77), or between the fulcrum lever bracket (75) and the operating shaft (74), these parts may be removed after taking out the spring plate set screw (73) and pulling the operating shaft (74) from the end cover (38). A socket wrench with an opening 3/16" across the flats is necessary. The ends of the spring on the plate (78) should contact both sides of the prong. The control rod link (28) can be removed from the control rod link pin (31) if there is excessive play between the pin and the fulcrum lever assembly (20). Do not remove the cam (24) unless it must be replaced. Be sure the nut is tight on the square head bolt (23). Do not remove the stop plate bridge (55) and the stop plate (56) unless they must be replaced.

The governor weight and shaft assembly (18) may be disassembled if necessary. Unless the bearing or shaft is in need of replacement, there is no cause to separate these parts. If the weights (5) have excessive play on the governor weight pins (3), the cotter keys (1) and washers (2) can be removed, and the pins (3) driven from the governor spider. Do not drive on the drilled end of the pin. The bushings (4) in the weights can be replaced and line-reamed to size. Both bushings are not reamed to the same size. The bushing with the large bore is on the same side of the governor weight as the long arm which extends from the weight to operate the governor sleeve (19). This bushing is reamed to .3700" to .3705" for the .3680" to .3685" end of the pins (3). The small diameter bushing is reamed to .3545" to .3550" for the .3525" to .3530" end of the pins (3). The governor weight shaft (14-A) is ground to .385" to .390", while the bushing in the sleeve (19) is finished to .3750" to .3756".

The governor weight pins are hol-

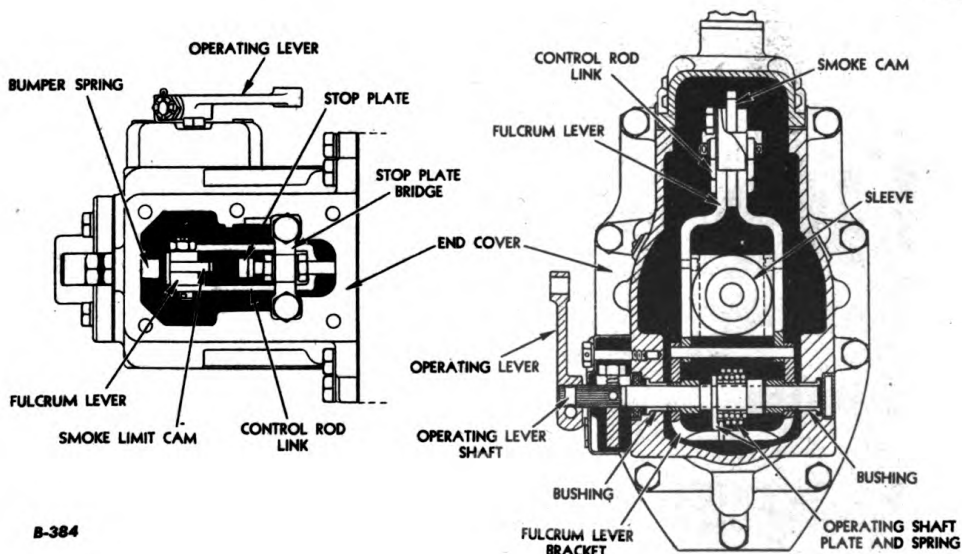
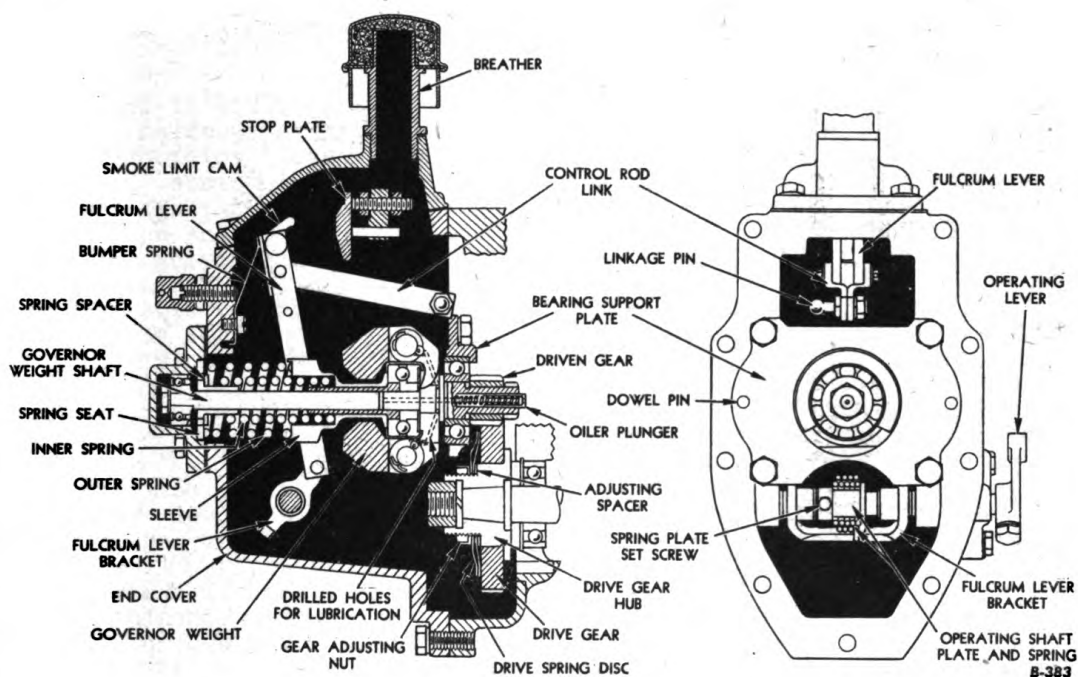
low from the large end almost to the small diameter end. Holes are drilled in the pins (3) to meet this long hole. The grooves at these holes distribute the oil to the bushings in the governor weights. The governor weight shaft (14-A) is drilled from the gear end back to the area of travel of the sleeve (19). The spider (14-A) is also drilled to meet a hole in the shaft. The baffle (42-A), *Illust. 5*, is so situated that it collects oil thrown from the gears. The center of the baffle contacts the spring-loaded governor shaft plunger oiler (12) and (13), *Illust. 9*. Oil flows from the reservoir, through the plunger, and inside the shaft from where it is distributed to the sleeve (19) and to the governor weights through drilled holes in the shaft, the spider (14-A) and the pins (3).

If wear is excessive, the bushings (94) may be removed from the end cover (38). After pressing replacement bushings in place, line-ream them to .377" to .378".

Reassembly of the Governor

If new bushings have been assembled to the weights and properly line-reamed to size, hold the weight (5), *Illust. 9*, in place and press the pin (3) into the spider (6), being sure the small end of the pin enters from the large bore bushing side of the weight. Cotter key holes should be equal distance from the weight on both sides. Replace washers (2) and cotter keys (1). The head of the cotter key is normally on the inside. Bend both ends of the key back around the pin. If bearing (11) has been removed from the shaft (14-A), press the bearing into the bearing support plate (10) and then assemble the unit to the shaft. Push the driven gear on the end of the shaft and lock the nut after tightening. Bend the lock over, all the way around the nut. Replace the governor shaft plunger oiler (12) and the spring (13) after blowing air through holes in the shaft.

FUEL SYSTEM - Continued



Illustr. 10
Cross Section of the Governor.

REPAIR SECTION

FUEL SYSTEM - Continued

Reassembly of the Governor - Continued

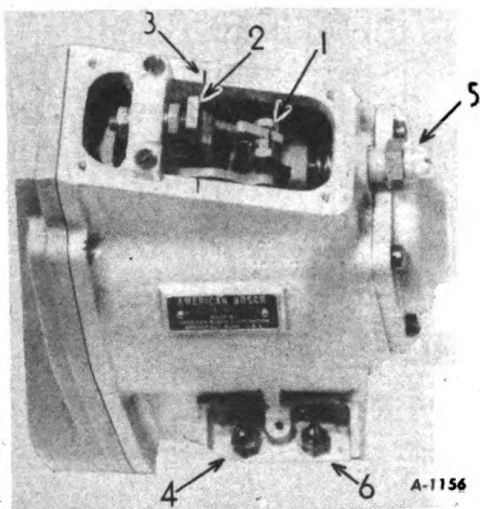
Assemble the fulcrum lever (20) to the fulcrum lever bracket with pin (77). Bend both ends of the cotter keys (76). Attach the control rod link (28) to the fulcrum lever, with the linkage pin (27) on the smoke limit (24) cam side of the fulcrum lever. Set the assembly in the end cover (38), slide the operating lever shaft (74) in place, hold the shaft plate with spring (78) in place, and push the shaft in as far as it will go. The spring end of the plate (78) faces the control lever side. Be sure to engage the prongs of the spring over the bracket (75). Locate the set screw (73) in the tapped hole in the plate (78) and in the hole in the shaft (74). Use a 3/16" socket wrench to tighten the set screw.

Engage the slots of sleeve (19) in the pins of the fulcrum lever (20). Then slide the governor shaft assembly (18) into place. Locate the bearing support plate (10)

over the dowel pins in the end cover (38). Be sure the cut-out side of the bearing plate is on the bottom, and that the cap screws with lock washers are all drawn tight.

Where original parts of the governor are being reassembled, put the inner and outer governor springs (32) and (33) in place. Set the inner and outer springs spacers (79) to (84) on the spring seat (34) and slip the spring seat over the shaft. Slide bearing (35), with the projecting side against the shoulder, on shaft (18). Tighten nut (37) with lock (36) in place, bend the lock, and replace the end cap (65) with the gasket (64).

Where new springs or parts are included in the governor assembly, replace the outer spring and move the control lever (69-A) toward the front of the pump all the way. The end of the spring should extend .020" outside the end of the end cover (38). If the spring does not extend slightly, measure the distance from the outer spring



- (1) Scratch line on smoke limit cam and fulcrum lever.
- (2) Stop plate.
- (3) Scratch line on end cover to line up stop plate.
- (4) High idle speed stop screw.
- (5) Bumper spring adjuster.
- (6) Pump shut-off stop screw.

Illust. 11
Top View of Governor with
the Inspection Covers Removed.

FUEL SYSTEM - Continued**Reassembly of the Governor
- Continued**

seat in the sleeve (19) to the outside of the end cover (38) where the end cup attaches. Measure the length of the outer spring. Add spring spacers of .020", .042", .058", or .083" thickness, or a combination of these spacers, to make the distance measured up to .020" but not more than .020" longer than the length of the spring. The counterbore in the sleeve (19) for the inner spring (32) is much deeper than that for the outer spring (33).

With the proper outer spacer, if any, and the inner spring in place, hold the spring seat lightly against the outer spring, being sure the entire assembly is as far forward as it will go. With a depth gauge, measure the distance

from the end of the inner spring to the outer surface of the spring seat. Holes in the spring seat are provided to make this measurement. Try several positions of the spring seat. Subtract .125" from this dimension to allow for the thickness of the spring seat. Inner spacers of necessary thickness should be used to reduce the measurement to .138" (3.5 mm.) or the required spring gap. Put the springs in place in the governor, place the spacers required on the spring seat (34), slide the seat on the shaft (18), and complete the assembly as outlined in the foregoing paragraph.

After reassembly is completed, clean with Diesel fuel. Dry off any excess oil with clean, dry air. Attach the unit to the pump housing and test as outlined under the heading, "Basic Tests and Adjustments".

REPAIR SECTION

MEMORANDA

POWER TAKE-OFF

Front Power Take-off

After taking the driven member from the end of the front power take-off shaft remove the six 3/8" hex. nuts from the studs (11), *Illustr. 1*, in the fan drive pulley (2). Lift off the nut locks (9), felt washer retainers (8), felt washer (7), shaft retainers (6), and pull out the front power take-off shaft. The coupling (5) can be slid from the studs on the fan drive pulley.

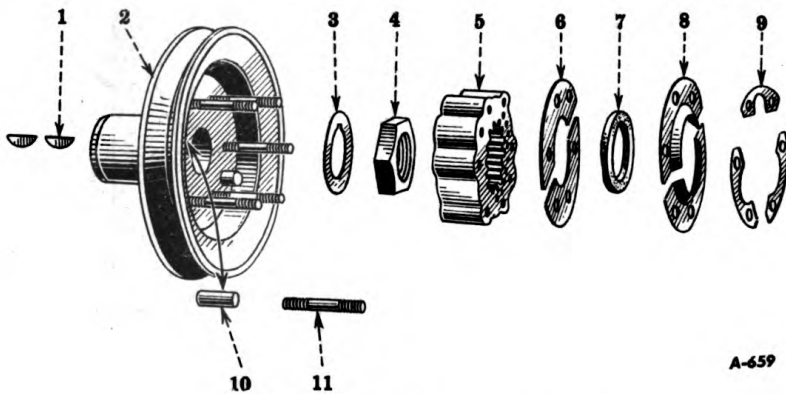
Reassembly of this unit is the reverse of removal procedure.

When the complete radiator is removed from a tractor equipped with the front power take-off, the replacement procedure necessitates special steps so that the lower radiator water tank will be aligned with the engine crankshaft and the front finished facing will be square with the center line of the crankshaft.

After the radiator is replaced, loosen the bolts holding the lower radiator water tank to the main frame side channels. Bolt an alignment gauge coupling similar to that sketched in *Illustr. 2* to the front power take-off coupling. Screw the alignment gauge coupling shaft into the coupling. Slip the alignment gauge bearing on the shaft and insert it into the bore of the radiator tank. The gauge bearing should enter readily and the outer flange should fit all around against the machined face of the water tank. Use a feeler gauge for this purpose.

If necessary, slightly slot the bolt holes in the main frame side channels to facilitate alignment. When alignment is perfect tighten bolts in the water tank and side channels.

In order to eliminate the necessity for going through the aligning procedure on future removals



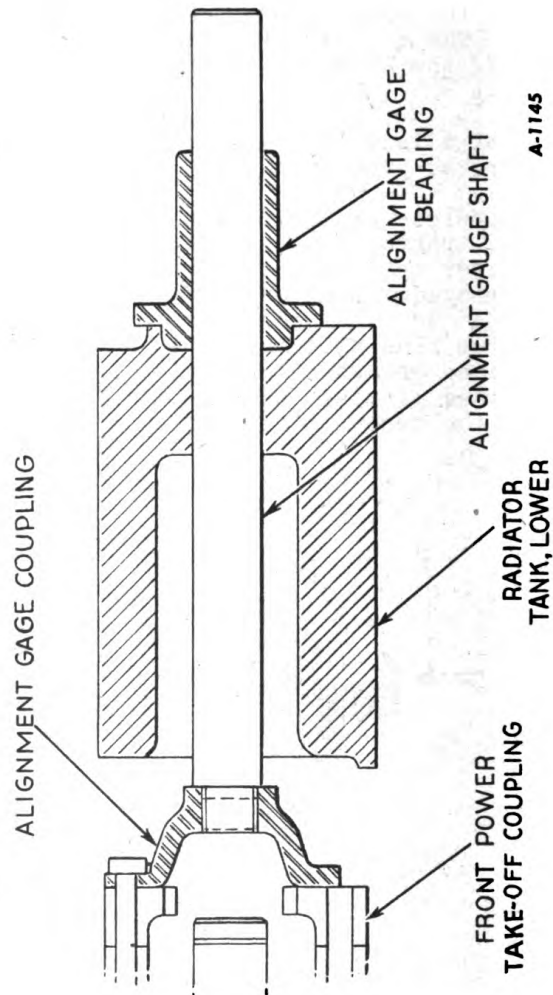
Illustr. 1

Exploded View of Front Power Take-Off Coupling Assembly

Ref. No.	Description	Ref. No.	Description
1	Key.	7	Felt washer.
2	Pulley with drive pins.	8	Felt retainer.
3	Nut lock.	9	Lock.
4	Nut (regular pulley nut).	10	Pin.
5	Coupling (14 teeth).	11	Stud.
6	Shaft retainer.		

REPAIR SECTION

POWER TAKE-OFF - Continued



A-1145

Illustr. 2
Cross-Section of Gauge to be used for Checking Alignment
of Lower Radiator Water Tank with Respect to the Crankshaft.

POWER TAKE-OFF - Continued

Front Power Take-off
- Continued

of the radiator, two 1/2" dowels may be assembled to the side of the tank by drilling two 15/32" holes through the main frame side channels and into the water tank when alignment is secured and both parts are tightly bolted together. Finish-ream the holes to .497". Space the holes conveniently near the bolts to avoid interference, and use 1-1/8" to 1-3/8" length dowels.

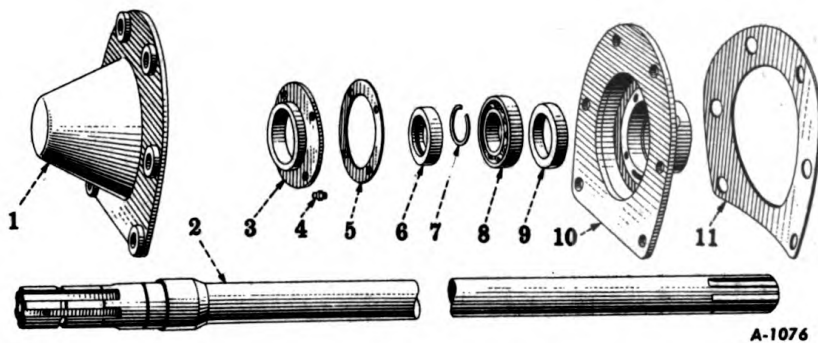
Rear Power Take-off

The rear power take-off consists of a shaft mounted in the rear of the main frame which passes inside the upper spline shaft of the transmission and is driven from the transmission drive gear. When not in use, the rear end of the shaft

can be enclosed with the cover (1) *Illust. 3.*

To remove the shaft with its attached parts, take out cap screws holding bearing cage (10) to the main frame and use puller cap screws to withdraw the entire unit. After taking the cap screws out of the bearing retainer (3), the retainer with oil seal (6) and gasket (5) can be removed from the shaft. Taking the snap ring (7) from the shaft (2) allows the shaft to be pulled from the bearing cage (10). The bearing (8) and the oil seal (9) can now be removed from the bearing cage (10). The leather lip of oil seal (9) faces the drive bevel gears. The lip of seal (6) faces the bearing (8).

Reassembly and replacement is the reverse of the above. Be sure to use new gaskets (5) and (11).

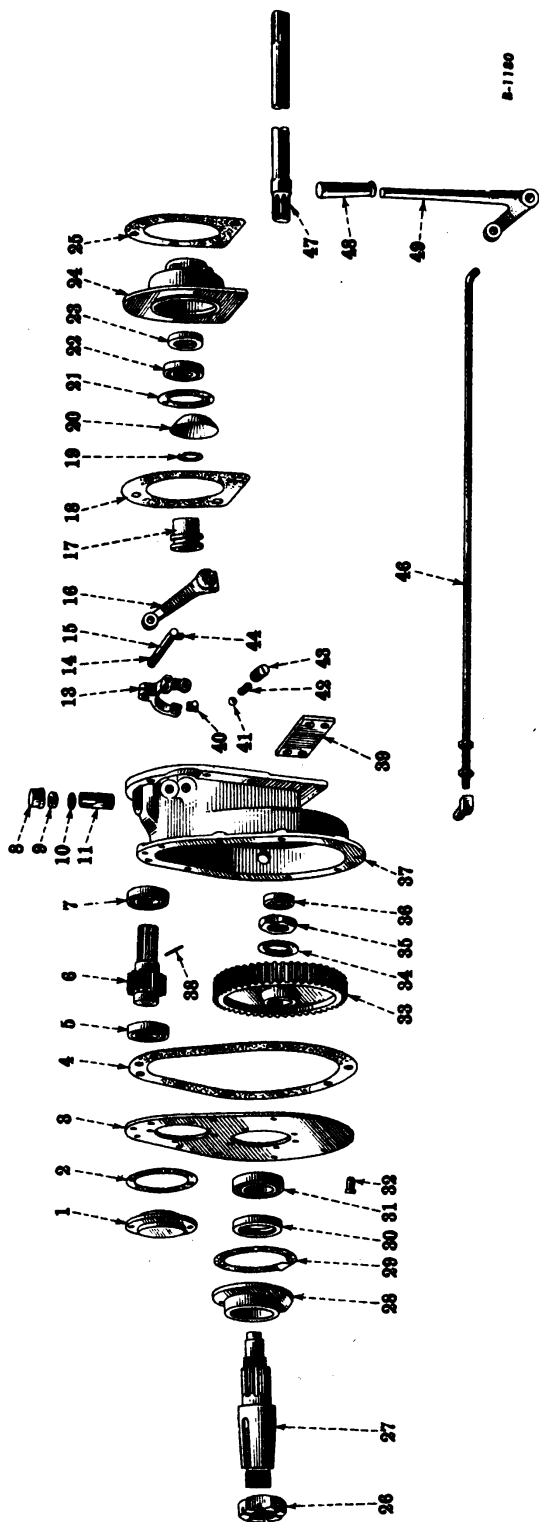


Illust. 3
Exploded View of the Rear Power Take-Off

Ref. No.	Description	Ref. No.	Description
1	Cover.	7	Snap ring.
2	Power shaft.	8	Bearing.
3	Retainer with seal.	9	Oil seal, inner.
4	Lubricator.	10	Cage with seal.
5	Gasket.	11	Gasket.
6	Oil seal, outer.		

REPAIR SECTION

POWER TAKE-OFF - Continued



Illustr. 4
Exploded View of the Reduced Speed Power Take-Off.

POWER TAKE-OFF - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Pinion bearing cage.	20	Power shaft oil slinger.	36	Gear shaft bearing, inner.
2	Pinion bearing cage gasket.	21	Power shaft bearing cage retainer.	37	Housing.
3	Housing cover.	22	Power shaft bearing.	38	Shifter coupling stop pin.
4	Housing cover gasket.	23	Power shaft oil seal, inner.	39	Housing spacer.
5	Pinion bearing.	24	Power shaft bearing cage.	40	Shifter pin.
6	Pinion {13 teeth}.	25	Power shaft bearing cage gasket.	41	Shifter poppet (ball).
7	Pinion {22 teeth}.	26	Gear shaft nut.	42	Shifter poppet spring.
8	Pinion {26 teeth}.	27	Gear shaft.	43	Shifter poppet bushing.
9	Pinion bearing.	28	Gear shaft outer bearing cage.	44	Shifter shaft key.
10	Pipe cap (1").	29	Cage gasket.	45	Power take-off shifter lever rod adjusting block.
11	Breather felt.	30	Oil seal.	46	Power take-off shifter lever rod.
12	Breather screen.	31	Gear shaft bearing, outer.	47	Power shaft.
13	Breather pipe.	32	Housing cover dowel pin.	48	Shifter hand lever handle.
14	Shifter fork.	33	Gear {52 teeth}.	49	Shifter hand lever.
15	Shifter shaft.	34	Gear {43 teeth}.	50	Shifter hand lever bracket.
16	Shifter lever.	35	Gear {39 teeth}.		
17	Shifter coupling.		Gear clamp nut lock.		
18	Housing gasket.		Gear clamp nut.		
19	Power shaft bearing retainer snap ring.				

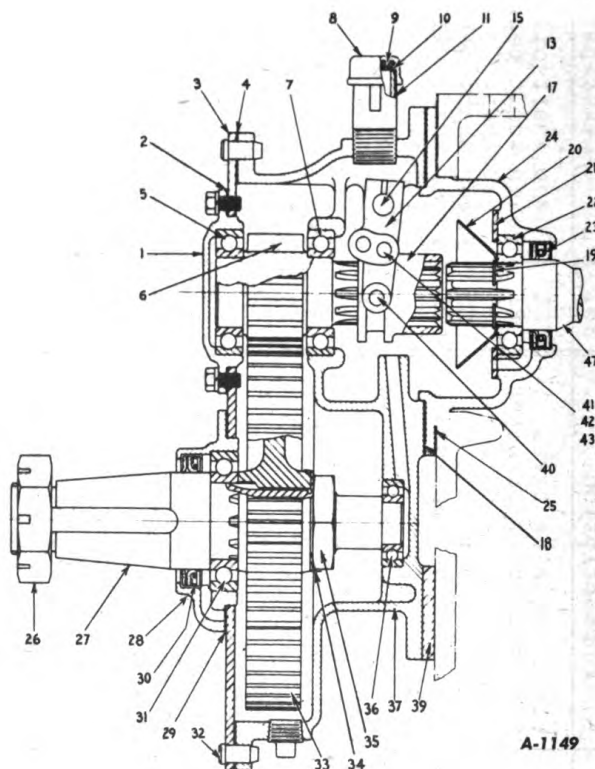
POWER TAKE-OFF - Continued

Reduced Speed Rear Power
Take-off

The reduced speed rear power take-off attaches to the rear of the main frame. A long shaft of the unit extends forward, passes inside the upper spline shaft, and is driven by a spline within the transmission drive gear. The speed reduction portion of the assembly is contained within the housing (37), *Illust. 4*, which can be removed by disconnecting shifter rod (46) from shifter lever (16), shifting the lever (16) to the engaged position, removing cap screws holding the housing (37) to the main frame, and lifting spacer (39) from between the two castings. This assumes that all

parts attached to the gear shaft (27) and not shown in *Illust. 4* which might interfere with the removal of the unit are removed prior to proceeding as outlined. The power shaft unit including items (18) to (25) and item (47) can be removed by applying puller cap screws to the tapped holes provided in the bearing cage (24).

The power shaft (47) and the oil slinger (20) can be removed from the power shaft unit after the snap ring (19) is removed. Taking out the cap screws in the bearing retainer (21) allows the bearing (22) and the oil seal (23) to be removed from the bearing cable (24). The lip of the leather oil seal faces the drive bevel gear compartment.



Illust. 5
Cross-Section of the Reduced Speed Power Take-Off.

POWER TAKE-OFF - Continued

Ref. No.	Description	Ref. No.	Description
1	Pinion bearing cage.	26	Gear shaft nut.
2	Pinion bearing cage gasket.	27	Gear shaft.
3	Housing cover.	28	Gear shaft outer bearing cage.
4	Housing cover gasket.	29	Cage gasket.
5	Pinion bearing.	30	Oil seal.
6	{ Pinion (13 teeth).	31	Gear shaft bearing, outer.
	{ Pinion (22 teeth).	32	Housing cover dowel pin.
	{ Pinion (26 teeth).		{ Gear (52 teeth).
7	Pinion bearing.	33	{ Gear (43 teeth).
8	Pipe cap (1").		{ Gear (39 teeth).
9	Breather felt.	34	Gear clamp nut lock.
10	Breather screen.	35	Gear clamp nut.
11	Breather pipe.	36	Gear shaft bearing, inner.
13	Shifter fork.	37	Housing.
14	Shifter shaft key.	38	Shifter coupling stop pin.
15	Shifter shaft.	39	Housing spacer.
16	Shifter lever.	40	Shifter pin.
17	Shifter coupling.	41	Shifter poppet (ball).
18	Housing gasket.	42	Shifter poppet spring.
19	Power shaft bearing retain- er snap ring.	43	Shifter poppet bushing.
20	Power shaft oil slinger.	44	Shifter shaft key.
21	Power shaft bearing cage retainer.	45	Power take-off shifter lever rod adjusting block.
22	Power shaft bearing.	46	Power take-off shifter lever rod.
23	Power shaft oil seal, inner.	47	Power shaft.
24	Power shaft bearing cage.	48	Shifter hand lever handle.
25	Power shaft bearing cage gasket.	49	Shifter hand lever.
		50	Shifter hand lever bracket.

Reduced Speed Rear Power
Take-off - Continued

The disassembly of the parts in the housing (37) starts with the removal of the pinion bearing cage (1). The bearing (5) may or may not come out with the bearing cage (1). (Also refer to *Illust. 4.*) Take out the cap screws and dowel pins (32) in the housing cover (3). Remove the cover, taking with it the gear shaft (27) and the gear (33). The bearing (36) may or may not come out with the shaft.

Now the pinion (6) with the bearings (5) and (7) can be pulled from the housing. The shifter coupling (17) will then drop out. To remove the shifter fork (13) assembly, lift out the shifter pins (40), remove the shifter poppet bushing

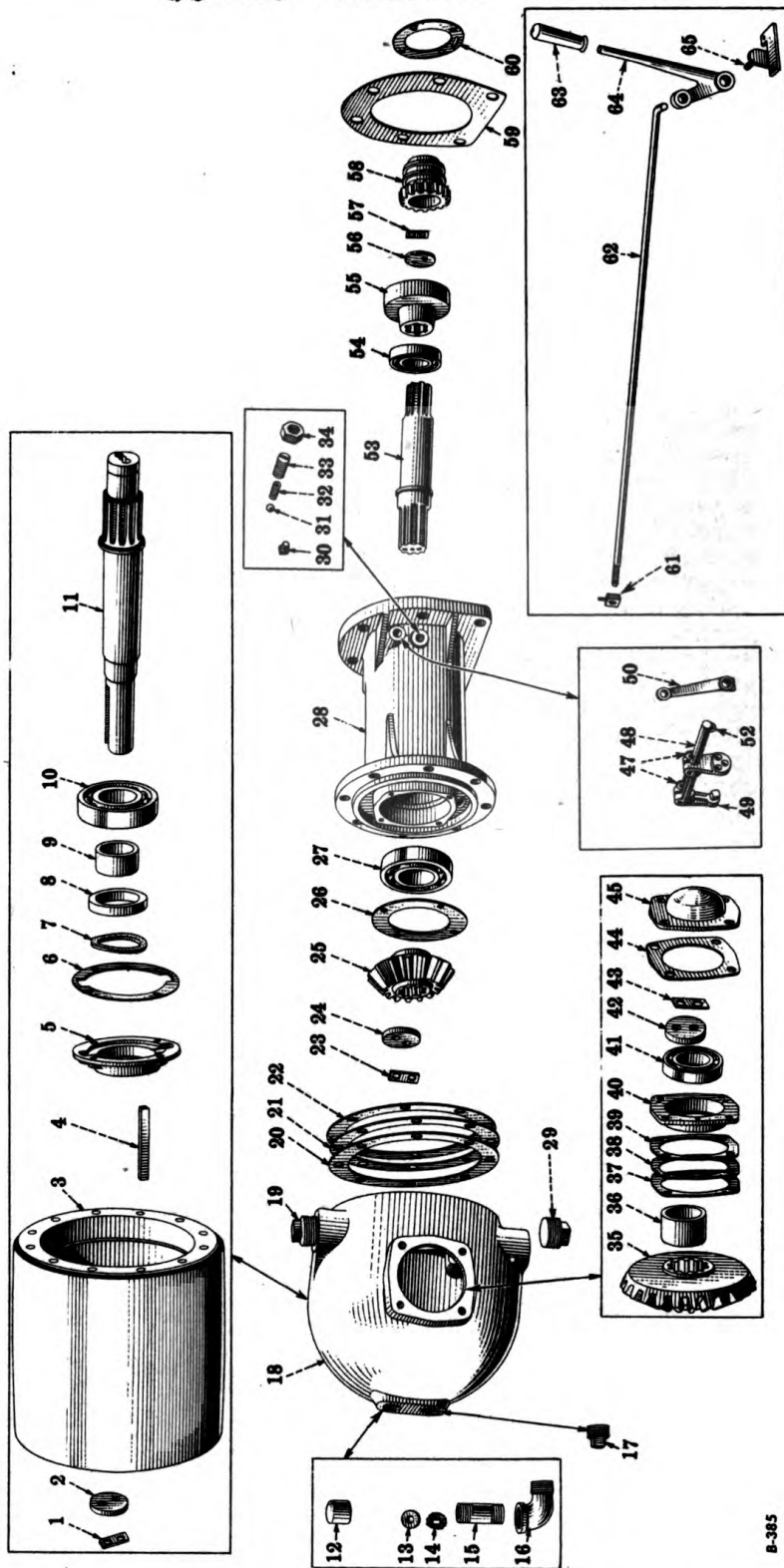
(43), poppet spring (42) and poppet (41). Take out the screw in the shifter fork (13) and pull the shifter shaft (15) out of the housing (37) with the shifter lever (16).

To disassemble the gear shaft (27) pull the bearing (36) from the shaft and remove the nut (35) with the lock washer (34). The gear (33) can then be pulled from the shaft. Removing the bolts in the bearing cage (28) allows the shaft (27), the bearing cage (28), gasket (29), oil seal (30), and bearing (31) to be pulled from the housing cover (3). Pulling the bearing cage from the shaft allows the oil seal to be replaced. The lip of the leather oil seal faces the inside of the housing.

Reassembly of the unit is the re-

REPAIR SECTION

POWER TAKE-OFF - Continued



Illustr. 6
 Exploded View of the Belt Pulley Assembly.

B-385

REPAIR SECTION

Power Take-Off - 8

Page 9

POWER TAKE-OFF - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Lock.	26	Retainer.	52	Key.
2	Washer.	27	Bearing.	53	Shaft.
3	Pulley.	28	Carrier.	54	Bearing, front.
4	Key.	29	Pipe plug, 1-1/2".	55	Pulley coupling (16 teeth).
5	Cage with felt and seal.	30	Pin.	56	Washer.
6	Gasket.	31	Poppet.	57	Lock.
7	Felt.	32	Spring.	58	Shifter coupling (16 teeth).
8	Oil seal.	33	Bushing.	59	Gasket.
9	Spacer.	34	Hex. jam nut, 3/4" N.C.	60	Retainer.
10	Bearing.	35	Gear (24 teeth).	61	Belt pulley shifter lever rod adjusting block.
11	Pulley shaft.	36	Spacer.	62	Belt pulley shifter lever rod.
12	Pipe cap, 1".	37	Shim, heavy.	63	Belt pulley shifter hand lever handle.
13	Felt.	38	Shim, medium.	64	Belt pulley shifter hand lever.
14	Screen.	39	Shim, light.	65	Belt pulley shifter hand lever bracket.
15	Pipe.	40	Cage.		
16	Street ell, 1".	41	Bearing.		
17	Pipe plug, 1".	42	Washer.		
18	Gear box with plugs.	43	Lock.		
19	Pipe plug, 1-1/2".	44	Gasket.		
20	Shim, heavy.	45	Cap.		
21	Shim, medium.	46	Plug.		
22	Shim, light.	47	Key.		
23	Lock.	48	Shaft.		
24	Washer, (15 teeth).	49	Fork.		
25	Pinion (15 teeth).	50	Lever.		

POWER TAKE-OFF - Continued

Reduced Speed Rear Power Take-off - Continued

verse of the disassembly procedure. When replacing the shifter fork (13), be sure there is equal clearance between shifter pins (40) and the shifter coupling (17). Do not turn the shifter poppet bushing (43) in too far or it will strike against the shifter fork.

Belt Pulley

The belt pulley attaches to the main frame over the end of the power take-off. After removing the mounting bolts from the carrier (28), *Illust. 6*, the entire unit can be slid from the end of the power take-off shaft.

Disassembly of the Belt Pulley

The pulley (3) can be pulled off after taking out two 1/2" cap screws and bending back the cap screw lock (1) between cap screws and the retainer washer (2). Items (4) to (22) and (35) to (45), inclusive, can be removed as a unit after taking out eight 5/8" cap screws holding the gear box (18) to the carrier (28). The shims (20), (21), and (22) are used to set the gears properly for tooth contact.

With the pulley removed, the shaft (11) can be taken out. Remove the cap screws from the bearing cap (45) and the bearing retainer washer (42). Tapped holes are provided in the bearing cage (40) for puller cap screws. The oil seal cage (5) can be removed and the assembly forced out from that side. The gear (35) and spacer (36) can then be lifted from the gear box (18).

The oil seal (8) and felt washer (7) can be taken out of the oil seal cage (5) if their replacement is desirable. The bearing (10) can be pressed from the shaft (11). The shims (37), (38), and (39) are of varying thickness and are used

to obtain the proper running clearance or backlash between the gears. Two cap screws in the bearing retainer washer (43) hold the bearing (41) on the shaft (11).

The shifter coupling (58) can be removed by disengaging it from the coupling (55). The shaft (53) can be removed from the carrier (28) after taking the cap screws from the bearing retainer washer (56) and from the bearing retainer (26). Slide the pulley coupling (55) off the forward end of the shaft and push the pinion (25) with bearing (41) out of the rear end of the carrier (28). The bearing (54) can then be removed from the carrier.

The shifter mechanism can be removed after taking the cap screws from the shifter fork (49) and pulling on the shifter lever (50). When the round keys (47) clear the shifter fork, they may be lifted out and the shaft (48) withdrawn from the carrier. The poppet ball (31), poppet spring (32), and the fork (49) can all be taken out of the carrier.

The power take-off can be disassembled after taking off the retainer (60) and the snap ring (7), *Illust. 3*, from the shaft assembly.

Reassembly of the Belt Pulley

Reassembly of the units is practically the reverse of the disassembly procedure. Assemble the carrier unit and the gear box units separately. The carrier assembly can be completed by pressing bearings (27) and (54), *Illust. 6*, on the shaft (53). Put the bearing retainer (26) in position with cap screws in the retainer. Attach the pinion (25) and bolt it securely with retainer washer (24) in place. Assemble the shaft unit to the carrier and bolt the bearing retainer (26) to the carrier (28). Then attach the coupling (55) and the bolt or retainer (56).

POWER TAKE-OFF - Continued**Reassembly of the Belt Pulley
- Continued**

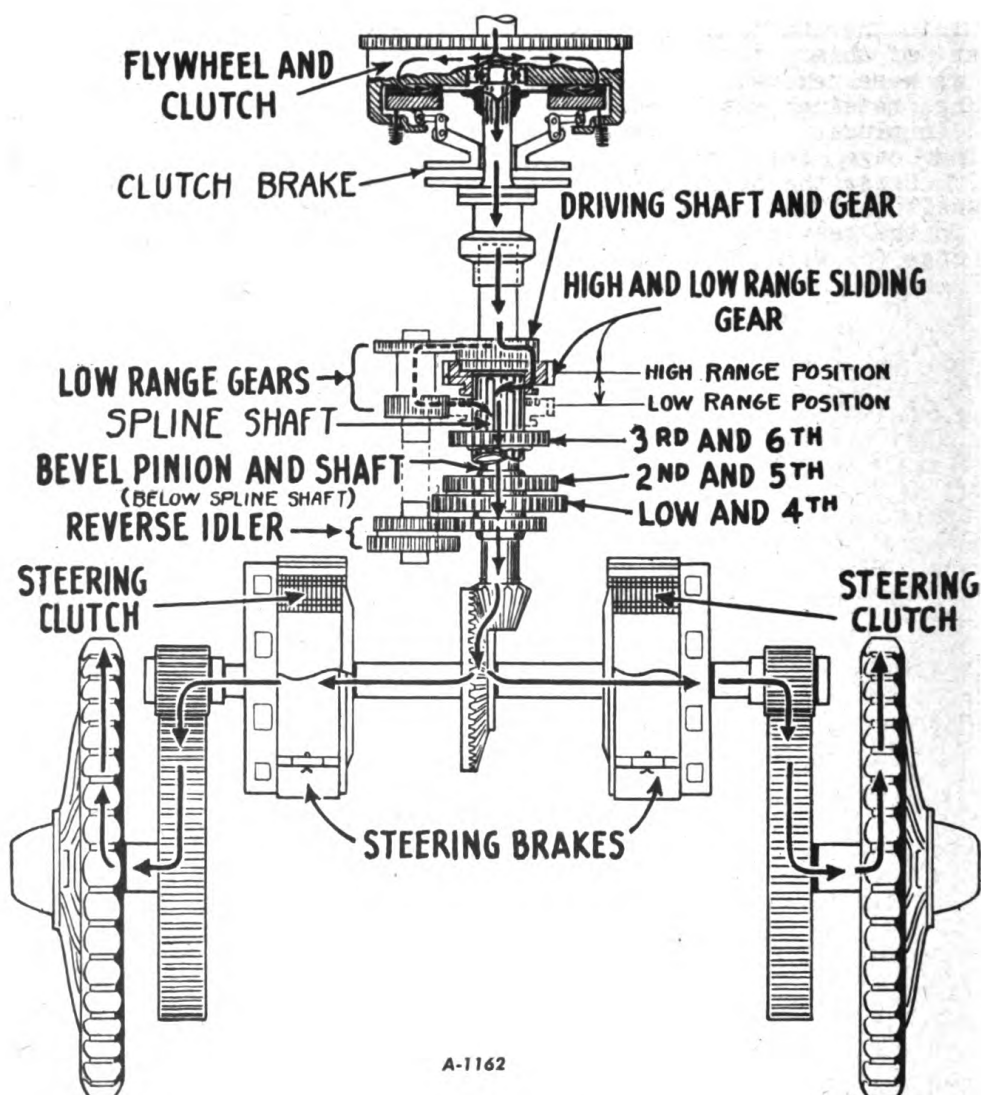
Place the pulley shaft (11) in the gear box (18). Set the gear (35) over splines of the shaft. Slide on the spacer (36) and press the bearing cage (40) with the bearing (41) into the shaft, using the same number of shims (37), (38), and (39) as were removed. Attach the bearing retainer washer (42) and bolt in place. Then press the bearing cage into the gear box (18). Press the bearing (10) on the shaft (11) and press into position in the gear box. Add the oil seal cage (5) with spacer (9), oil

seal (8), felt washer (7), and gasket (6).

Connect the gear box to the carrier with the shims (20), (21), and (22) in place. Test gears for the proper backlash. The heels of the gears should be flush as observed through the opening in the top of the gear box when lighted through the other holes in the gear box. The backlash of the gears should be .004" to .008". Rearrange the shims (37), (38), and (39) to obtain this backlash. Reassemble the rest of the parts in the reverse of the disassembly procedure.

REPAIR SECTION

POWER TRAIN



Illustr. 1

Schematic Drawing Tracing the Line of Power from the Engine Through the Engine Clutch, Transmission, Bevel Gear, Steering Clutches, Sprocket Drives, and Sprockets to the Tracks.

POWER TRAIN - Continued**Line of Power**

The line of power from the engine is through the flywheel and engine clutch to the transmission and bevel gears. The power is distributed to both sides through the steering clutches to the sprocket drive gears, sprockets, and track chains on each side of the tractor.

The transmission has six forward speeds and two reverse speeds. Standard shifting is controlled by one lever while the change from the high to low range is controlled by another lever. An automatic clutch brake on the engine clutch comes into action to facilitate easy shifting of gears when the shift lever is pushed as far forward as possible. Gears are assembled on three shafts which are mounted in the rear main frame. The bevel pinion and shaft revolve on a straight roller bearing in a bearing cage next to the pinion. A ball bearing at the opposite end takes up the end thrust and the bearing cage is shimmed from the transmission end cover for cone setting of the bevel gear.

The upper shaft or spline shaft revolves in two bearings which are in cages. It is hollow to allow the power take-off shaft to pass through it, thus driving direct from the drive gear assembly.

The Hi-Lo and reverse gear shaft is stationary in the main frame and the transmission end cover. The reverse gear revolves in two roller bearings and the Hi-Lo gear on a roller bearing and a ball bearing.

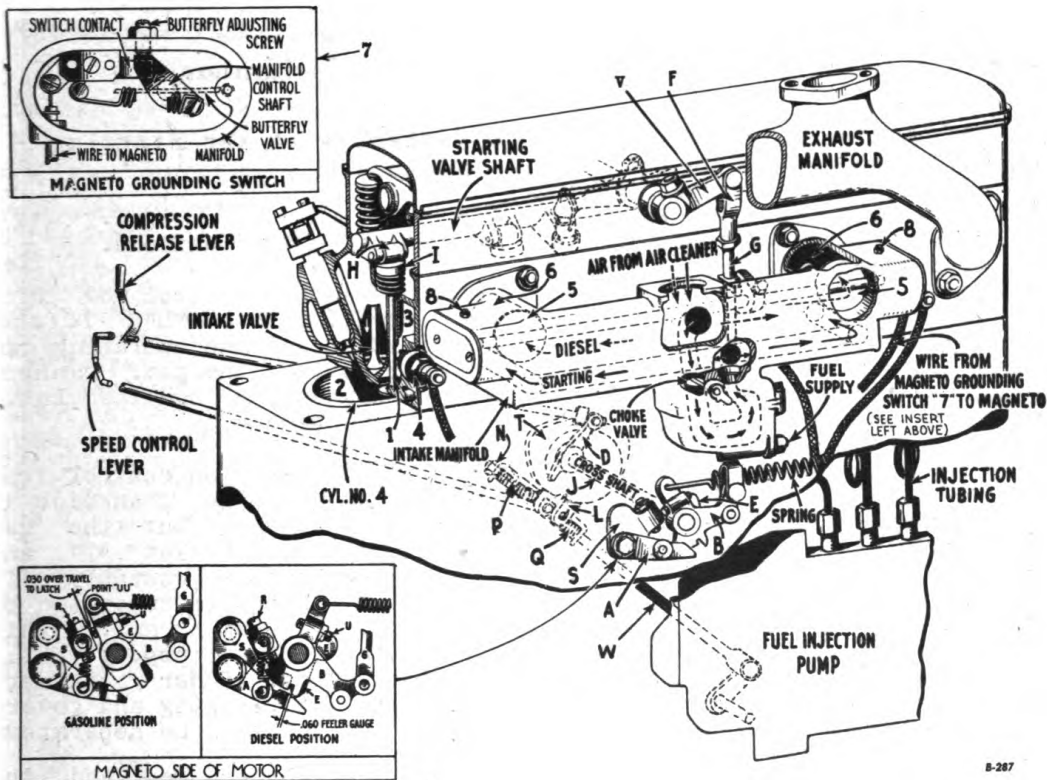
The clutch brake operates automatically when the clutch is fully disengaged.

When both steering clutches are engaged, power is equally transmitted to each track. By disengaging one steering clutch, all the power is applied to one track. If one clutch is disengaged and the steering brake applied on the same side, the tractor pivots on its track. The steering brake is a band around the steering clutch drum and is used only for pivot turns and parking purposes. Disengaging both steering clutches at the same time or disengaging the engine clutch stops the tractor.

REPAIR SECTION

MEMORANDA

STARTING SYSTEM



Illust. 1

Schematic Drawing of the Diesel Engine Starting System.

Operation

The engine is temporarily converted to a gasoline engine during the starting process. After the engine is operated on gasoline for about a minute, the starting mechanism is manually released and the engine will operate on Diesel fuel as a full Diesel engine. *Illust. 1* shows the 45° head engine starting mechanism. Both engine and starting mechanism are in the gasoline operating position. To start the engine, the operator pulls down the speed control lever all the way. This shuts off all the fuel supply to the nozzles from the fuel injection pump. Next, the compression release lever is pulled back until jaw "B" locks behind latch "A".

This operation accomplishes four things:

- a. It opens four starting valves (1), *Illust. 1*, thereby enlarging combustion chamber (2) by auxiliary chamber (3) and exposing spark plug (4). The enlarged volume reduces the compression ratio to that of a conventional gasoline engine or about 6.4 to 1.
- b. It closes the two butterfly valves (5) in the air intake manifold, closing the Diesel air intake passage from the air cleaner to cylinder intake parts. The solid arrows show the path the air must take. It passes down through the carburetor, around a disc-type air valve (8), *Illust. 5*, and then

STARTING SYSTEM - Continued

Operation - Continued

through small high velocity passages to intake ports in the cylinder head. Spark plugs ignite the air-gasoline mixture which is compressed by the pistons in the low-compression chamber (3), *Illust. 1.*

c. It connects the magneto electrical circuit by opening the magneto grounding switch in the front end of the intake manifold. (See Insert 7, upper left corner, *Illust. 1.*)

d. It releases the needle valve (4), *Illust. 5*, in the carburetor fuel bowl by turning cam (2), allowing the needle valve to be actuated by the float.

The operator then starts the engine with the aid of the electric starter or hand cranking. After the engine has operated on gasoline about a minute, the compression release lever is pushed all the way forward. The engine speed control lever is raised to the operating position at the same time, and the engine runs as a full Diesel.

Raising the compression release lever depresses latch "A", *Illust. 3*. The spring attached to jaw "B" pulls it around, pulling down rod "G" and opening butterfly valves (5), *Illust. 1*. Rod "G" also closes starting valves (1). The carburetor needle valve (4), *Illust. 5*, is locked on its seat and the magneto grounding switch (7), *Illust. 1*, is closed. The engine operates on the Diesel cycle while the carburetor, magneto, spark plugs and low-compression chambers are all inactive. The broken line arrows indicate the air path for Diesel operation.

Starting Mechanism

Disassembly of the Starting Mechanism

Remove the intake manifold.

Disconnect the control rod from the operating lever "D", *Illust. 3*, and disconnect the operating rod "G" by removing the pin. Unhook the return spring and the latch spring and remove.

The governor friction control can be removed from the crankcase if desired by taking out the cap screws in the bracket "T" and pulling the entire assembly off. Friction discs may be separated by removing the tension nut. This allows the spring, poppet ball, friction discs, inner retainer, stationary disc, spring and governor control lever to be separated.

Remove the cotter key and the washer (carburetor side) from the cross shaft and remove the jaw "B". The shaft can now be pulled from the crankcase with the jaw lever "E" which then can be taken from shaft by removing the lock nut and taper pin.

Remove the latch "A" by taking out the screw. Remove the latch bracket "S" by removing the nut from the stud holding the bracket to the crankcase.

Reassembly of the Starting Mechanism

Place the latch bracket "S" on the stud and replace the nut. (Do not tighten). Replace the latch "A" and screw in the latch pin. Tighten the stud nut and latch pin. Place the jaw lever "E" on the cross shaft, assembling it to the side

STARTING SYSTEM - Continued

Reassembly of the Starting Mechanism - Continued

that has the cotter key hole. Replace the pin in the lever and tighten the nut.

The governor friction control can be reassembled by setting a friction disc over the inner retainer, followed by the stationary disc, and another friction disc. Then the governor control lever "L" can be inserted both through and over this assembly with the spring and poppet in place. Draw down the spring nut with a pronged tool so that 10 ft.-lbs. torque are required to turn the control lever. (See *Illust. 4*).

Place the cross shaft in the crankcase and assemble the lever (1), after putting the governor friction control in place. Be sure to locate the spring and poppet in the

lever "L", and locate the stationary disc over the peg in the crankcase.

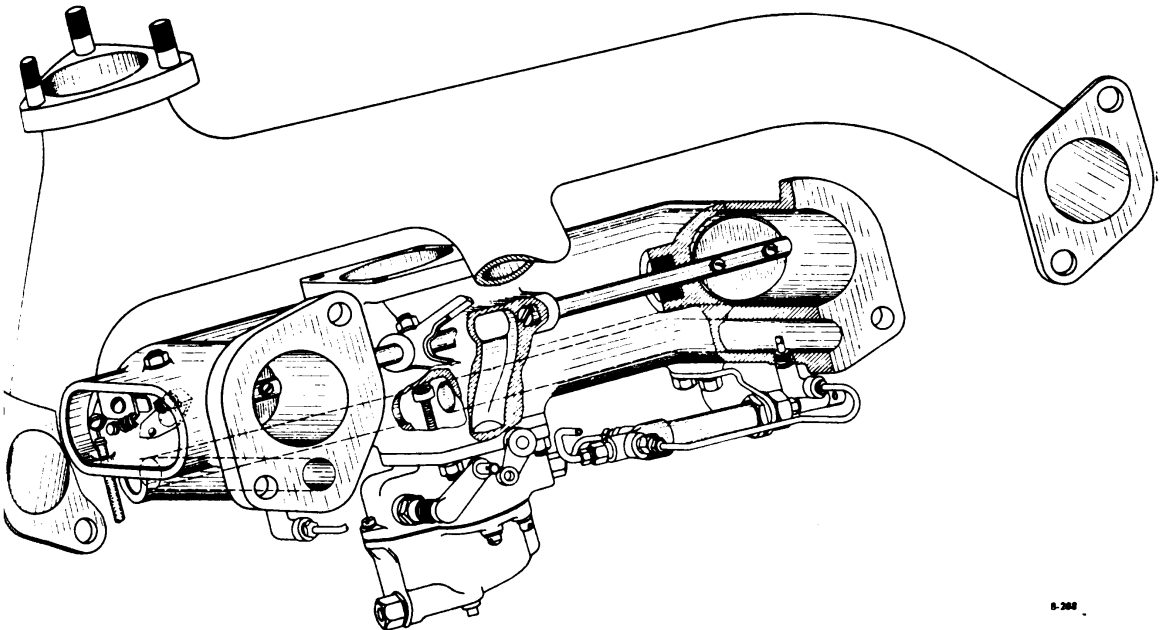
Place the jaw "B" on the cross shaft. Replace the washer and cotter key. Replace the return springs and the latch spring. Connect the operating yoke "G" to the jaw "B" by replacing the pin and cotter key.

Adjust the starting mechanism as outlined and replace the intake manifold.

Intake Manifold

Disassembly of the Intake Manifold

Remove the intake manifold from the engine as outlined under the "Engine", Section III. Remove the carburetor and primer from the manifold.



Illust. 2

The Intake Manifold as seen when looking from the Center of the Engine toward the manifold.

STARTING SYSTEM - Continued

Disassembly of the Intake Manifold - Continued

Remove the end cover and the over-center spring. Remove the nut from the butterfly valve control lever and drive out the pin. Remove the screws holding the butterfly valves (5), *Illust. 1*, and pull out the valves. The butterfly valve control shafts can now be pulled out of the manifold. The dust seals may also be removed.

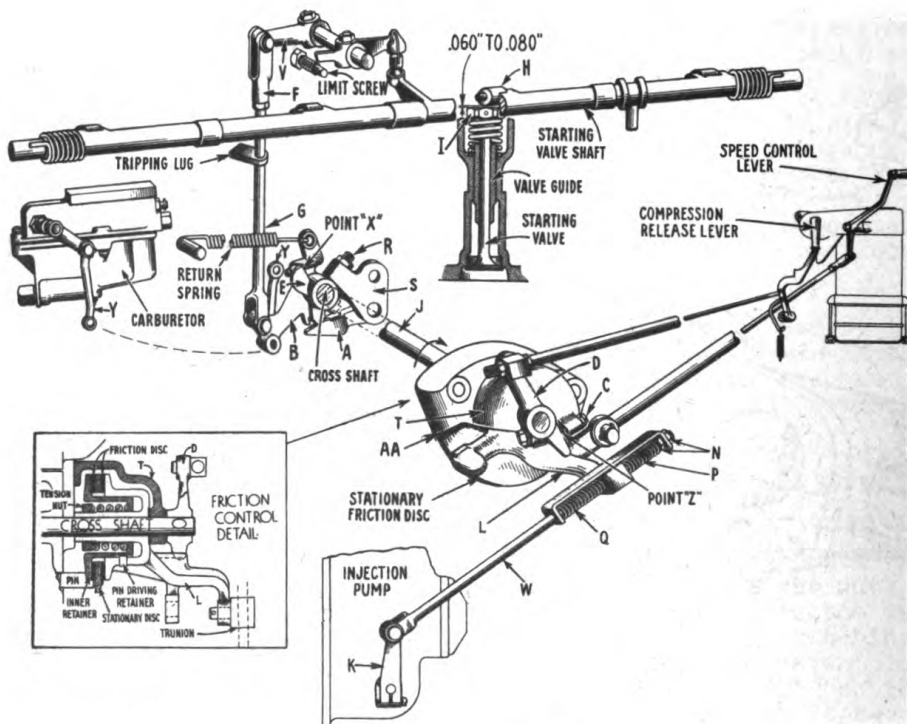
Reassembly of the Intake Manifold

Assemble new seals in the manifold. Install the seals, with the edge toward the outside. When assembling the control shafts, be careful not to damage the seals.

Reassemble the starting mechanism in the manifold by reversing the procedure used in disassembling. Be sure the control lever is placed on the front butterfly valve control shaft when reassembling.

Loosen the lock nuts (8), *Illust. 1*, on top of the manifold at each end and adjust the set screws until the butterfly valves (5) are horizontal when in the Diesel position. This is necessary to assure the maximum amount of air entering the cylinders when operating on the Diesel cycle.

Adjust the starting valve mechanism, install the carburetor and primer, and assemble the manifold to the engine. Be sure the short bar on the operating rod "G" is engaged in the butterfly valve control lever.



B-279

Illust. 3
The Engine Starting Control Mechanism and Governor Friction Control.

STARTING SYSTEM - Continued

Adjusting the Starting Valve Mechanism

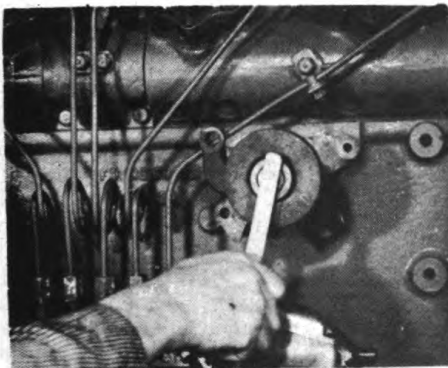
Set the starting mechanism for Diesel operation:

1. Adjust screw "R" until .060-inch exists between jaw "B" and latch "A" (see lower left insert, *Illust. 1*).

2. Adjust yoke "F", *Illust. 3*, on rod "G" so that when it is connected to lever "V" there will be a minimum clearance between the starting valve shaft roller "H" and spring retainer "I" of .060-inch over the closest valve.

There should be no greater clearance than .080-inch over any of the other valves. If it is impossible to adjust the valve clearances on all four valves within the limits of .060-inch to .080-inch, check the rollers for wear and the roller shaft for twist. Lock yoke "F" with the lock nut.

3. Rotate the cross shaft with the compression release lever until lever "E" contacts the pick-up face of jaw "B" at point "X". Now adjust set screw "C" on the pump side to give .100-inch between the set screw "C" and lever "D" at point "Z".



Illust. 4
Increasing Tension on Governor Friction Control Discs.

Set the starting mechanism for gasoline starting:

1. Adjust set screw "U", *Illust. 1*, in jaw "B" to .015-inch between set screw "U" and lever "S" at point "UU".

2. If the intake manifold has been removed it should now be assembled in place and connect link "Y", *Illust. 3*, to the carburetor lever.

Start the engine and run as a Diesel:

1. Retard the speed control lever until the poppet in lever "L" locates in a countersunk hole in the stationary friction disc; this is the low idle speed position.

2. Adjust nuts "N" on rod "W" until springs "P" and "Q" are of equal length, and the engine runs at low idle speed.

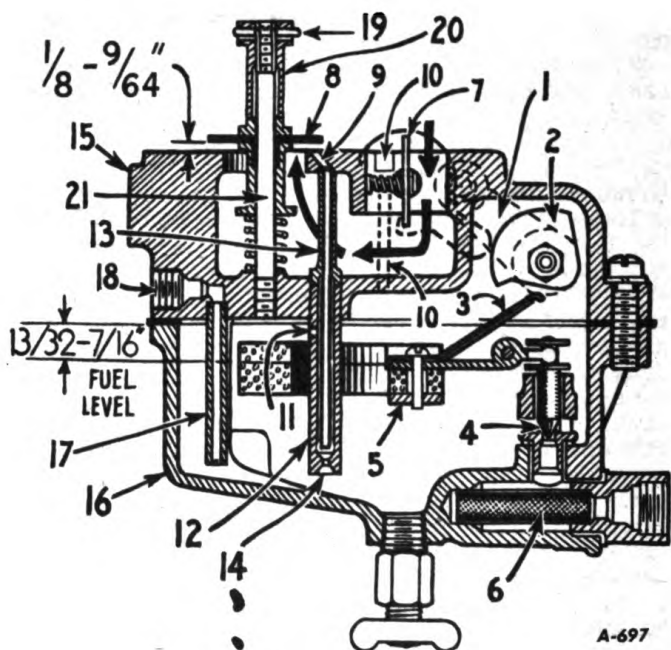
3. Move the speed control lever to the extreme shut-off position. Adjust the yoke on the speed control rod so that lever "L" just contacts bracket "T" at point "AA" so that the pump shuts off. Reset the control lever on the pump if necessary, to make the pump shut off. Spring "Q" should be slightly compressed.

4. Operate the engine at full throttle. Adjust the speed control lever stop screw on the air cleaner so spring "P" is compressed, but not compressed solid.

Starting Carburetor

A dual manifold carburetor is used on this Diesel engine. As outlined just previously in this section, link "Y", *Illust. 3*, is connected to jaw "B" and to the carburetor locking lever (1), *Illust. 5*. Pulling back the compression release lever turns the cross shaft and lever "E", *Illust. 3*, which in turn rotates jaw "B". Jaw "B" is

STARTING SYSTEM - Continued



Illustr. 5

Cross Section of the Starting Carburetor. 1. Lever; 2. Cam; 3. Float spring; 4. Needle valve; 5. Cork float; 6. Screen; 7. Starting shutter; 8. Air valve; 9. Nozzle discharge; 10. Drilled passage; 11. Air bleed hole; 12. Metering well; 13. Nozzle; 14. Jet; 15. Body; 16. Fuel bowl; 17. Fuel inlet tube; 18. Tapped hole; 19. Cotter; 20. Air valve collar; 21. Air valve guide.

Starting Carburetor - Continued

free on the cross shaft. As link "Y" is raised with jaw "B", the carburetor locking lever (1), *Illustr. 5*, is also raised. Raising this lever rotates cam (2) inside the carburetor fuel bowl. In the Diesel position, cam (2) contacts spring (3) holding needle valve (4) against its seat. Rotating cam (2) takes it out of contact with spring (3), allows float (5) to drop and lift needle valve (4) from its seat. Gasoline must pass through filter screen (6) before entering the needle valve assembly. When the fuel level is 13/32-inch to 7/16-inch from the top of the float chamber, float (5) will have raised far enough to hold needle

valve (4) on its seat and shut off the fuel supply. As fuel is used, the float maintains the level by opening and closing the needle valve.

Illustr. 5 shows a cross section of the mechanism and parts of the dual manifold carburetor. The exploded view is shown in the *Spare Parts Catalog*. With manifold valves in the gasoline starting position, the air from the air cleaner is drawn past the choke valve (7), diagonally across upper body (15), and around air valve (8) which is open at all times. The vacuum around valve (8) draws the fuel mixture from the discharge nozzle (9). The mixture is carried through the small diameter passage to the intake parts.

STARTING SYSTEM - Continued

Starting Carburetor - Continued

The drilled passage (10), shown with dotted lines, equalizes the air pressure in the fuel bowl for the air bleed (11). The air bleed is located in the side of the metering well (12). As the engine picks up speed, the fuel level in the well is lowered. When it is lowered below the bottom of nozzle (13), air will be drawn from the air bleed and gasoline from jet (14), providing the proper mixture ratio for constant idling speed. Jet (14) at the bottom of the well (12) is the same in principle as the main jet in a conventional carburetor.

When removing the carburetor, remove link "Y", *Illust. 3*, from the float locking lever (1), *Illust. 5*, the dash choke control from the choke lever, the clip from the drip hole tube, the gasoline supply line, and four nuts from the manifold studs. The carburetor body (15) and fuel bowl (16) assemblies may be separated by removing five fillister head screws. Use a good gasket; it normally extends 1/32-inch beyond the bowl and body.

The fuel bowl assembly consists of the float assembly and fuel strainer. The fuel strainer is easily removed. Spring (3) on float (5) is normally 1/4-inch to 5/16-inch above the surface of the bowl. The fuel level is normally 13/32-inch to 7/16-inch below the top of the bowl; the float is 9/32 inch with the float loose and the needle valve held firmly on its seat. The float can be removed by applying a screwdriver to the float pivot screw on the outside of the bowl. A pivot pin is pressed in the pivot screw and extends 1-7/32-inch from the head of the screw. The pivot pin should be straight to avoid binding the

float. A spacer for piloting the other end of the pin is pressed in the fuel bowl. With the float removed, the needle valve may be withdrawn for inspection. If worn, replace both the valve and seat; they are furnished in pairs only as service parts. The needle valve cage hexagonal shape is 7/16-inch across the flats. The thickness of the gasket below the cage may be varied to change the fuel level. If the tang on the float is bent to change the level, remove the float from the pivot pin first to avoid bending the pivot pin.

As a solvent, use a solution of one part alcohol and one part benzine or a pure solution of acetone. Use either solution to dissolve all gums accumulating on carburetor parts. Blow off parts with clean dry air and reassemble as indicated in the foregoing. Do not run wires through the needle valve cage.

The drip hole filler is accessible after removing the drip tube and adapter. The packing should be replaced if it has disintegrated, to prevent entrance of dirt.

The supply for the primer extends down into the fuel bowl and may be easily unscrewed from the body (15) for cleaning. A slot in the end of the tube is .028-inch to .040-inch. The primer can be attached to the tapped hole adjacent to the drip tube.

The metering well (12) and nozzle (13) assembly is easily removed for cleaning by applying a thin screwdriver to the .045-inch to .059-inch slot in the bottom end. When replacing, after cleaning, be sure the upper end of nozzle (13) enters the hole in the top surface of the body (15). Use only a solvent and air to clean these parts. The opening (9) should be clean.

STARTING SYSTEM - Continued

Starting Carburetor - Continued

The air valve (8) should be 1/8-inch to 9/64-inch open at all times. Remove the cotter key (19) at the top of the air-valve collar (20) and rotate the collar to give the proper opening. The spring at the bottom of the air valve maintains the valve in the open position. Be sure the air valve is square with the bore and an equal distance from the top surface of the body all the way around. The valve may be pushed down against the body (15) to check the above. The guide (21) should be square with the top surface of the body. If the guide is replaced, the top end should be 1-1/4-inch above the surface of body (15). On the bottom surface of the body, stake the guide to prevent its turning. The free length of the spring is 9/16-inch and tests 3 lbs. at 3/8-inch.

The choke valve (7) is equipped with a spring-loaded air valve to prevent excessive choking. The air valve should open freely. The choke may be removed by taking the two screws in the valve and drawing the shafts from each side. The

body is not equipped with bushings for the shafts. Dust seals and retainers are located on each side and should be replaced if not in good condition. Soak the seals in oil before assembling. When replacing the valve, locate it in slots in the ends of the shafts and center it in the opening in the body before drawing up the two screws. The countersunk side of the shafts faces the heads of the screws; upset the ends of the screws.

The float locking lever (1) connected to link "Y", *Illust. 3*, etc., may be removed after taking the nut off the inside end of the shaft, slipping off the cam, and pulling out the shaft, spring, retainer, and two dust washers. If the bearing is worn it may be replaced by unscrewing from the body. It is furnished reamed to size as a service part. When replacing the assembly, have lever (1) *Illust. 5*, pointing toward the air valve (8); the flat sides of the shaft are then vertical. The cam is then assembled with the large rounded side toward the top of the body. Replace the nut on the end of the shaft and draw it up tight.

STEERING MECHANISM

Steering Clutches

There are two 15" multiple dry-disc, spring-loaded-type steering clutches. They are located in separate compartments, one on each side of the bevel gear compartment at the rear of the main frame. They can be removed individually with their release mechanism without disturbing the bevel pinion adjustment or sprocket drive assembly.

Removal of the Steering Clutches

To remove either steering clutch, proceed as follows:

1. Drain oil from the transmission.
2. Remove the seat, frame, fenders, fuel tank, batteries, and supports being sure to disconnect the fuel lines and electric wiring.
3. Remove from the main frame cover the two inspection covers and the clutch lubricator grease tube fitting bolts, and the springs, cap screws, retainers, and levers on top of the release forks; the transmission gear shifter housing; and cap screws and dowel pins.
4. Remove the main frame cover.
5. Tap the bearing cage (18), *Illust. 1*, from the release fork (19).
6. Loosen the brake band adjuster and take out the cotter key and pin from the steering brake band at the rear.
7. Remove the grease tubes (21) and (3) connected to the release collar (32) and the release fork lower bearing (29).
8. Remove the upper pin (31) from the release fork (19) by taking out the lower cotter key. Then turn the fork and lift the upper link (30) from the release collar (32).

9. Remove the lower pin (31) from the release fork by taking out the upper cotter key. Push the pin down to free the link. Turn the release fork and remove the lower link (30) from the release collar.

10. Lift out the release fork (19).

11. Remove the cap screws from the bearing cage cap (26) and slide the cap into the steering clutch.

12. Remove the two diametrically opposite cap screws (54), *Illust. 2*, from the hub plate (35) *Illust. 1*. Assemble the clutch compressor angle tool with two 5/8" N.C. by 1-1/2" and two 1/2" N.C. by 2-1/4" bolts. Turn in the bolts as far as possible to compress the spring (40) and disengage the steering clutch. The spring retainer (39) will move in until it contacts the hub (41) after approximately 1/2" travel.

13. Bend back the locks and remove the special cap screws (24) from the clutch coupling (22). Turn the bevel gear to make all cap screws accessible.

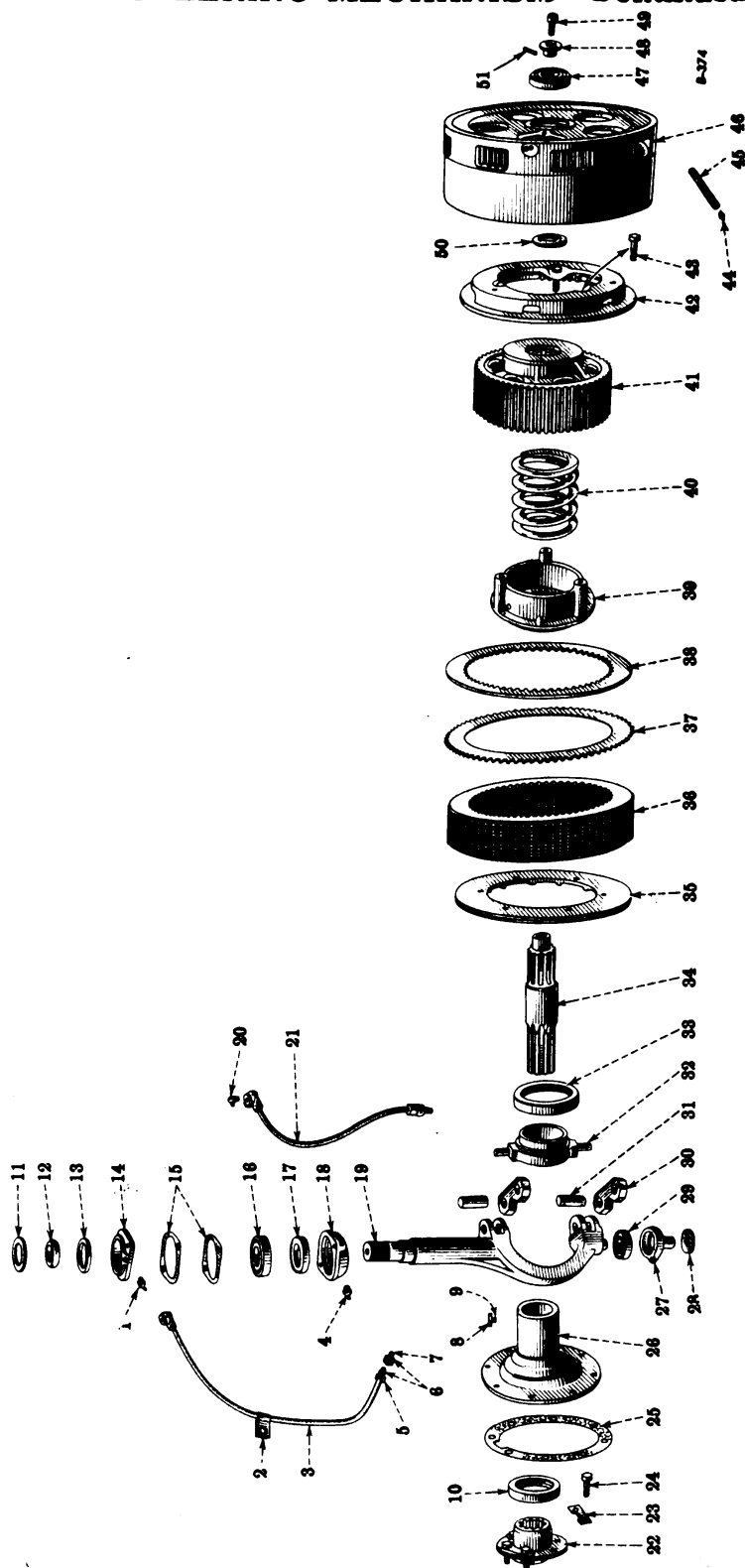
14. Remove cap screws from the steering clutch drum (46) at the sprocket drive pinion flange (52), *Illust. 2*. Revolve the drum with a bar to make all cap screws accessible. Mark the relative position of the drum on the flange so that the grease tube lines up with the notch at the center of the flange when reassembling. Cap screws are not all evenly spaced around the drum.

15. Put a sling on the clutch drum, pry the coupling (22), *Illust. 1*, into the bearing cage cap (26). Knock the assembly off the flange (52), *Illust. 2*, and lift out.

Replacement of the Steering Clutches

Steering clutches can be replaced by reversing the above procedure.

STEERING MECHANISM - Continued



Illustr. 1
Exploded View of the Steering Clutch and Release Fork.

STEERING MECHANISM - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Lubricator.	18	Bearing cage, with oil seal.	34	Shaft.
2	Clamp.	19	Release fork.	35	Plate.
3	Grease tube.	20	Lubricator.	36	(See Note *).
4	Lubricator (L.H.).	21	Grease tube.	37	Driving disc.
5	Lubricator (R.H.).	22	Coupling (12 teeth).	38	Friction disc.
6	Connector nut.	23	Lock.	39	Spring retainer.
7	Connector.	24	Bolt.	40	Spring.
8	Key, with pin.	25	Gasket.	41	Hub.
9	Pin.	26	Bearing cage cap, with oil seal.	42	Pressure plate.
10	Oil seal.	27	Bearing pivot.	43	Dowel.
11	Felt retainer.	28	Retainer.	44	Lubricator.
12	Spacer.	29	Bearing.	45	Lubricator pipe.
13	Felt.	30	Shifter link.	46	Drum.
14	Retainer.	31	Link pin.	47	Pilot bearing.
15	Gasket.	32	Release collar.	48	Retainer.
16	Bearing.	33	Thrust bearing.	49	Retainer bolt.
17	Oil seal.			50	Spacer.
				51	Steering clutch pilot bearing retainer pin.

* This assembly is made up of a group of driving discs (Ref. No. 37) and a group of friction discs (Ref. No. 38).

STEERING MECHANISM - Continued

Replacement of the Steering Clutches - Continued

The bearing cage cap gasket (25), *Illust. 1*, should be attached to the main frame before installing the clutch; the gasket is more easily protected from damage by doing this. Then compress the clutch as far as possible. Be sure that the socket head bolt (49) in the steering clutch shaft (34) is tight. The pin (51) in the retainer (48) fits into the drum (46) to keep the inner race of the bearing (47) from revolving on the shaft. It also maintains the bolt tension.

The bearing cage cap (26) and coupling (22) can be slid off the shaft to replace the double leather oil seal (10). Always install a new seal. A handy driver for this seal is provided by the coupling. Assemble the coupling bolts (24) to the coupling and slide the oil seal onto the coupling with the lips of the seal toward the flange of the coupling. Then use this assembly to press or drive the oil seal into the bearing cage cap (26). Be sure that the seal bottoms in the counterbore of the bearing cap.

Lubricate the finished surface of the bearing cage cap and slide the assembly onto the clutch shaft (34) together with the release collar (32) and the release bearing (33). Be sure that collar slides freely on the cap.

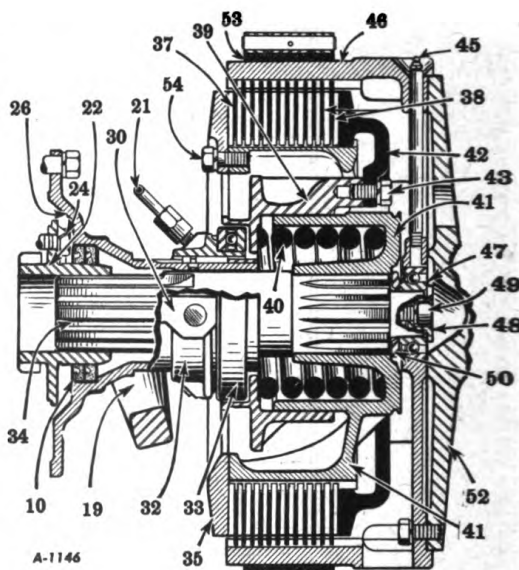
Use several cap screws to draw the steering clutch drum (46) onto the flange of the sprocket drive pinion shaft (52), *Illust. 2*, before centering the coupling (22), *Illust. 1*, and prying it into the hub of the bevel gear. Then insert the special cap screws (24) (punch-marked for identification) and lock them after tightening.

After assembling links (30) to the release fork (19) and the release collar (32), the cotter keys previously removed can be replaced. Turn the fork to one side and

spread one side of the key with a long screw driver or rod inserted through hand holes in the rear of the main frame.

Lubricate the pins of the release collar and release fork before replacing the main frame cover.

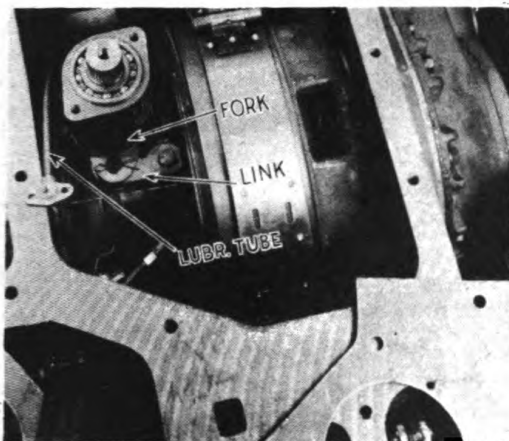
The clutches can be adjusted according to instructions in the "Operations Section."



Illust. 2
Cross Section of the Steering Clutch Assembly.

10. Oil seal; 19. Release fork; 22. Clutch coupling; 26. Bearing cage cap; 30. Shifter link; 32. Release collar; 33. Thrust bearing; 35. Hub plate; 37. Driving disc; 38. Friction disc; 39. Spring Retainer; 40. Spring; 41. Hub; 42. Pressure plate; 44. Pilot bearing lubricator; 46. Clutch drum; 47. Pilot bearing; 48. Retainer; 49. Retainer bolt; 50. Spacer; 52. Hub plate cap screws; 53. Steering brake band; 54. Sprocket drive pinion flange.

STEERING MECHANISM - Continued



Illustr. 3

View of the Left Steering Clutch Assembled, looking from the front.

Replacement of the Discs

With the clutch removed from the tractor the discs can be removed.

1. Assemble 1/2" cap screws to the three tapped holes in the pressure plate (42), *Illustr. 1*. The clutch can be compressed by turning these cap screws in.

2. If compressor angle tools have been used, they should be removed after turning the cap screws all the way in. On a clutch without the compressor tool assembled, the use of cap screws in the pressure plate (42) forces the plate to the right of the hub (41), or compresses the spring (40), or the pressure plate (42) moves while the hub holds its position on the shaft (34).

3. Now remove cap screws (54), *Illustr. 2*, from the hub plate (35), *Illustr. 1*, and lift it off.

4. Discs with internal teeth (38) and those with external teeth (37) can now be removed from the hub and the drum.

5. The drum (46) and shaft (34) can be removed from the assembly consisting of hub (41), pressure plate (42), spring retainer (39), and the spring (40).

6. Remove the socket head bolt (49), the retainer (48), and slide the shaft (34) out of bearing (33).

7. The bearing with its snap ring can be removed from the drum.

8. The spring (40) can be removed by holding the assembly with an arbor press, removing cap screws from the tapped holes of the pressure plate (42) and the three cap screws (43) holding the pressure plate (42) to the three prongs of the spring retainer (39).

9. The free length of the clutch spring is 6-9/16". The spring should rest evenly in both the retainer and the hub. The inside of the hub should show no marks caused by the spring binding on its side.

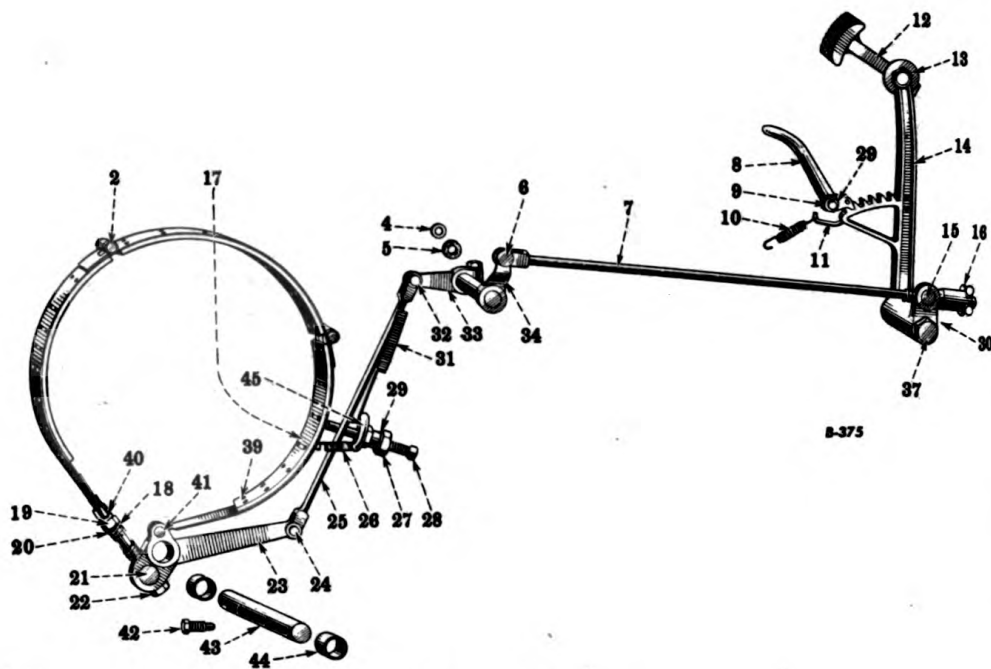
10. The outside surface of the hub (41) which contacts the retainer should be smooth so that the retainer (39) will slide freely on the hub (41). If the hub shows marks from binding in the retainer (39), assemble two cap screws to the retainer and the pressure plate (42). The third hole in the pressure plate should line up perfectly with the third tapped hole in the retainer. Any force used to remove the third bolt will cause the retainer to bind on the hub.

11. When reassembling the retainer (39), the spring (40), the hub (41), and the pressure plate (42) arrange the pressure plate on the hub so that the prongs of the retainer are centered in the holes of the hub. There should be 5/32" to 7/32" radial clearance.

12. The teeth on the hub, drum, and pressure plate should be smooth as well as all surfaces of the internal and external teeth discs.

13. The assembled clutch should run true and the outside diameter

STEERING MECHANISM - Continued



Illustr. 4
Steering Brake Assembly.

Ref. No.	Description	Ref. No.	Description
2	Pin.	22	Bolt.
4	Key for lever, inner.	23	Lever, with bushing.
5	Seal.	24	Pin.
6	Rod pin.	25	Rod, inner.
7	Rod, outer.	26	Anchor spring with hook.
8	Pawl.	28	Set screw.
9	Pawl stud.	29	Stud washer.
10	Pawl spring.	30	Pedal shaft lubricator.
11	{ Pawl link, left hand.	31	Release spring.
	{ Pawl link, right hand.	32	Pin, upper.
12	Pedal pad.	33	Lever, inner.
13	Swivel.	34	{ Lever, outer, left hand.
14	{ Pedal, left hand.		{ Lever, outer, right hand.
	{ Pedal, right hand.	37	Pedal shaft.
15	Pivot pin.	39	{ Lining rivet (.186 x 7/16").
16	Adjusting knob.		{ Lining rivet (.186 x 5/8").
17	Brake band lining.	40	Adjusting bolt spacer.
18	Washer.	41	Pin.
19	Nut (5/8" N.F.).	42	Shaft stud.
20	Spring.	43	Pivot shaft.
21	Pin.	44	Bushing.
		45	Anchor.

STEERING MECHANISM - Continued

Replacement of the Discs - Continued

of the coupling (22) should be concentric with the outside diameter of the drum (46).

After assembling steering clutches to the main frame and dowel pins to the main frame cover, place the release lever on the shaft of the release fork and check the free travel of the clutch for any possible binding of parts. Adjust the levers as outlined in the "Operations Section."

Steering Brakes

A steering brake is provided for each steering clutch. Its purpose is to stop the clutch drum from rotating after the steering clutch has been disengaged. Depressing one brake, locks the track on that side and forms a pivot point for short turns. The brakes can also be used for parking purposes. Each can be locked in position. Pedals for each brake are adjustable to suit the operator. The brakes are simple and readily accessible, contracting on the steering clutch drums.

The bands can be relined after removing them through convenient holes in the bottom of the main frame. No other part of the tractor need be removed.

Replacement of Brake Linings

Release the tension on the hand adjusting knob (16), *Illust. 4*. Then remove the hand hole covers from the bottom of the steering clutch compartments. Unhook the anchor spring (26) from the brake band and turn out set screw (28). Turn out the adjuster bolt (22) to free the band. Remove the cotter key and pin (24) from the linkage.

Take out the shaft stud (42) from the center end of the pivot shaft (43) and work the shaft to the side to free the pivot lever (23). Use a screw driver in the notches in shaft (43). Pull down on the pivot lever (23) to slide the band from around the brake drum.

Reline the bands, being sure to countersink the rivets well.

The bands can be replaced in the tractor by reversing the above procedure.

Replacement of Main Frame Brake Shaft Bushings

To replace these bushings (5) and (19), *Illust. 1*, Section 6, remove the outer rod (7) *Illust. 4*, from the lever (34).

Remove the main frame cover. Attach a wire to the spring (31) and disconnect it from the anchor (45) and the inner rod (25). A hole is provided inside the main frame through which the lock bolt in the inner lever (33) can be removed. Then pull out the outer lever (34).

Knock out caps (6) and (20), *Illust. 1*, Section 6, on the side of the main frame and drive out the bushings (5) and (19).

The dust seals in the main frame can be replaced.

Replace the bushings and press them in. The brake shaft bushings are furnished reamed to size.

The remaining steering brake assembly can be removed as previously described after which the pivot lever (23), *Illust. 4*, brake rod, and brake rod lever (33) can be pulled out through the bottom of the main frame.

REPAIR SECTION

MEMORANDA

TRACK

Track Chain

The track links are drop-forged, heat-treated steel. The track pins and bushings are machined, carburized, hardened steel forced into the links under great pressure. The pins move freely in the bushings and the ends are a press fit in the links. The left and right tracks are interchangeable.

Removal of the Track Chain

The track chains are easily removed. Each chain has a master pin identified by a locking wire. Have this pin at the front for easy removal. Take out the wire and drive the pin out of the links. Then back up the tractor to shed the track.

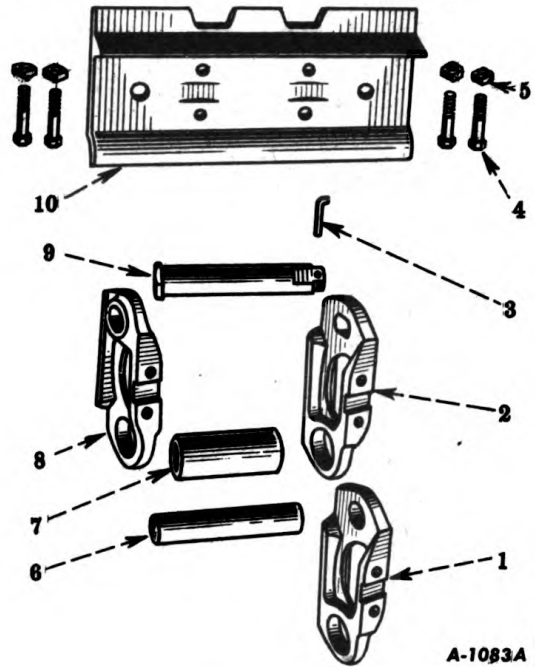
Replacement of the Track Chain

Lay the replacement track in line with the track being removed. Have the link without the bushing toward the tractor. Run the tractor forward on the new track. Then jack up the end of the new track and engage the bushings in the sprocket teeth. Guide the track around the sprocket and over the idlers as the tractor moves ahead. Line up the link in the bushing with a bar. Install the master pin and replace the lock wire.

Repair of the Track

Worn parts can be replaced by one of two methods, both of which require a hydraulic press with a special adapter ahead and fittings. The pin diameter is 1.622-inch to 1.625-inch and the clearance is .005-inch to .020-inch.

The track can be repaired when the shoes are on the chain or off.



A-1083A

Illust. 1
Exploded View of the Track Link, Pin, and Shoe Assembly.

Ref. No.	Description
1	Link, right hand.
2	Master link.
3	Lock wire.
4	Cap screw.
5	Nut.
6	Pin.
7	Bushing.
8	Link, left hand.
9	Master link pin.
10	Shoe.

The following procedure should be followed when the track shoes are assembled to the track:

Remove the track chain. Then press pin (6), *Illust. 1*, all the way out of each link which needs repairing, replacement, or reboring. Drive the old bushing (7) out and the new bushing in during the same operation when a bushing needs replacement. Place the links in relation to the track and push the

REPAIR SECTION

TRACK - Continued

Repair of the Track - Continued

pin (6) into the assembly, joining the links into a chain. If link (1) or (8) needs replacement, push out the old bushing only, then the link can be replaced.

To repair the track when the shoes are removed from the chain follow this procedure:

Remove the track chain. Push pin (6) just out of the "first link" (8).

NOTE: Carry each of the operations to completion for the entire length of the track to be repaired before proceeding to the rest of the operation.

The words "first link" imply that link (8) is to be moved separately.

The words "second link" imply that link (1) is removed with one pin (6) and one bushing (7) assembled to it.

Push the bushing (7) just out of the "first link" (8). After the pin and the bushing are out of the "first link" the sections of the track being repaired are composed of several loose links (8) and several three piece assemblies (1), (6), and (7) consisting of one link (1), and track pin (7), and one bushing (8). These assemblies can be separated from the chain by sliding the pin out of the next bushing.

The following steps pertain to the dismantling of these three-piece assemblies and reassembling them with new pins and new bushings.

Push bushing (7) out of the "second link". Push pin (6) out of the "second link". Push the new bushing (7) into the "second link".

Then push new pin (6) into the "second link". Push bushing (7) into the "first link" (1) while

assembling the section of the track to the track chain. Then push the pin into the "first link".

Track Rollers

Five track rollers on each side carry the weight of the tractor. These rollers are welded, heat-treated, steel-forged fittings with special alloy carriers with four bronze bushings which rotate on heat-treated steel shafts. They are effectively sealed at each end by three individual washers and a spring-loaded double-leather seal with the lips of the seal turned out. The rollers are gravity-lubricated at low turning speeds and pressure-lubricated at high speeds.

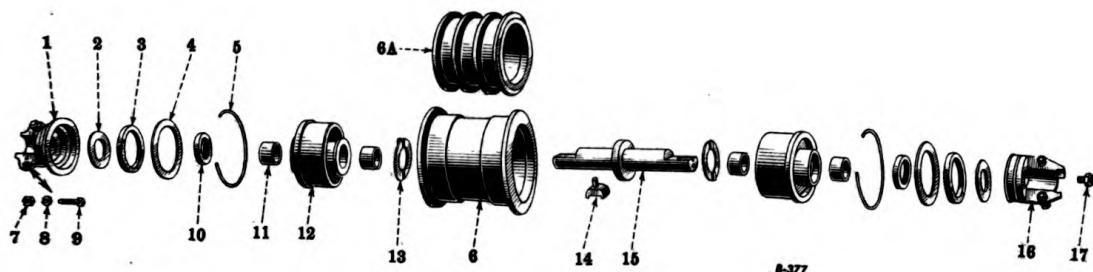
The rollers can be removed with or without removing the track chain. One of the easier and faster methods of removing all rollers is to remove the track chain but do not run off the track. Take out the two bolts in the front idler adjuster and slide the front idler assembly off the track frame. Then take off the track roller seals. Take out all bolts in the track roller brackets, jack up the track frame at the front, and slide all the rollers out the front of the track.

Disassembly of the Track Rollers

The inner (1) and outer (16) brackets, *Illust. 2*, can be slipped from the shaft (15). The outer felts (2), center felts (3), and corks (4) can also be removed. Then pry out the snap rings (5).

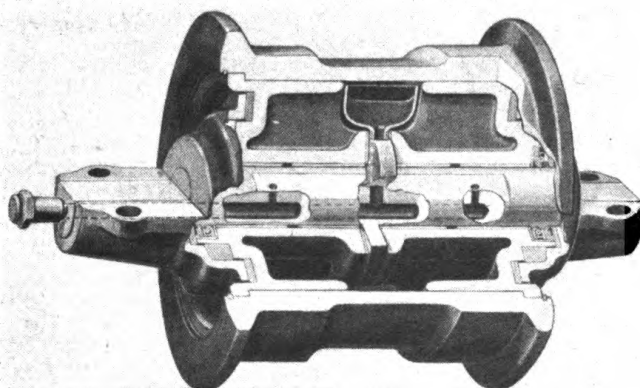
Place the roller (6) in an arbor press; by forcing out the shaft (15), one carrier (12) will come out of the roller. Then the other carrier can be forced from the roller. The shaft (15) can be lifted out of the carrier (12) and the oil scupper (14) can be removed.

TRACK - Continued



Illustr. 2
Exploded View of a Track Roller.

Ref. No.	Description	Ref. No.	Description
1	Bracket, inner.	8	Lock washer, 9/16".
2	Washer, outer.	9	Cap screw, 9/16 x 1-3/4" N.F.
3	Washer, center.	10	Oil seal.
4	Washer, inner.	11	Bushing set.
5	Snap ring.	12	Carrier set.
6	Roller (single flange) (1, 3 and 5).	13	Thrust washer set.
6A	Roller (double flange) (2 and 4).	14	Oil scupper.
7	Hex. nut, 9/16" N.F.	15	Shaft.
		16	Bracket, outer.
		17	Lubricator.



Illustr. 3
Cross-Section of a Track Roller. 1. Five seals. 2. Oil scupper.

REPAIR SECTION

TRACK - Continued

Disassembly of the Track Rollers - Continued

The thrust washers (13) should be replaced if they are damaged or worn.

The carrier bushings (11) are replaceable, reamed to size and need only be pressed in place, bevel first, until they are flush with the face of the carrier (12). Be sure all the oil holes are clean.

Reassembly of the Track Rollers

With the aid of an arbor press force one carrier (12) into the roller (6) until the flange of the carrier bottoms in the counterbore of the roller. Then insert the snap ring (5).

Place one thrust washer (13) in the carrier assembly, being sure that the lugs of the thrust washer engage the slots provided in the carrier.

With the oil scupper (14) inserted in the shaft (15), replace the shaft in the carrier roller assembly. With the other thrust washer in place, line up the lugs of the washer with the slots of the second carrier and put the second carrier in place until it bottoms in the counterbore. Then replace the second snap ring (5).

Slots in the carrier (12) may be lined up with the lugs on the washers (13) by holding the shaft (15) against the carrier as it is being pressed into the roller.

Replace new oil seals (10) in the carriers. The lips of the oil seals must face away from the center of the shaft. Assemble the felt washers (2) and (3) (saturated with oil) and the cork washers (4) to the carrier. Brackets (1) and (16) can then be replaced as can the lubricator (17). The entire roller assembly can then be replaced on the tractor.

Track Idler

The upper section of the track between the sprocket and the front idler is supported by two grey iron idlers with sealed outer faces (increased hardness). They are mounted on brackets extending upward from the track frame. The idlers revolve on heat-treated replaceable steel shafts which are locked in the brackets with bolts. A felt washer and spring-loaded leather seal with the lip turned toward the tractor are located in the bracket and idler respectively.

Each idler can be removed by blocking up the track chain, taking out the cap screws in the cover and those holding the retainer washer to the shaft. Removing the bolt from the bracket frees the shaft.

Disassembly of the Track Idler

Take out the cap screws from cap (8), *Illust. 4*, to remove the cap and gasket (7). Bend back the lock (6) and remove the two cap screws to release the washer (5). Then the idler (4) with the seal (3) can be pulled off the shaft (1). Washer (2) is then removed. If necessary, the bolt (10) may be removed from the shaft and the shaft driven from the spring guide or retainer (11).

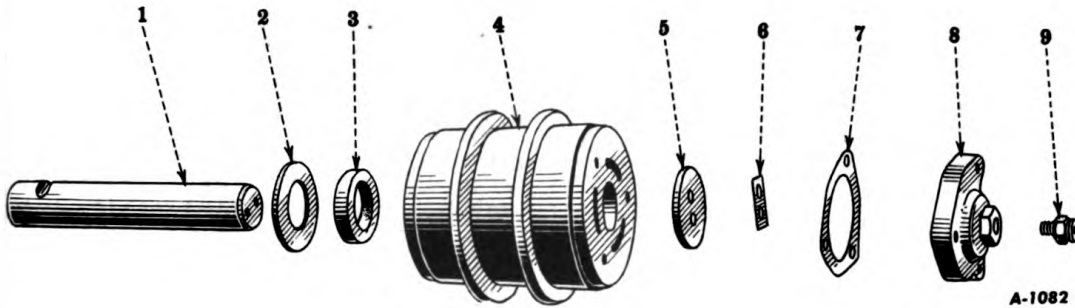
Reassembly of the Track Idlers

The reassembly of the idlers is the reverse of disassembly. Be sure to use a new oil seal (3) with the lip of the seal facing the tractor. Be sure that the lubricator (9) is clean when replaced.

Front Idler

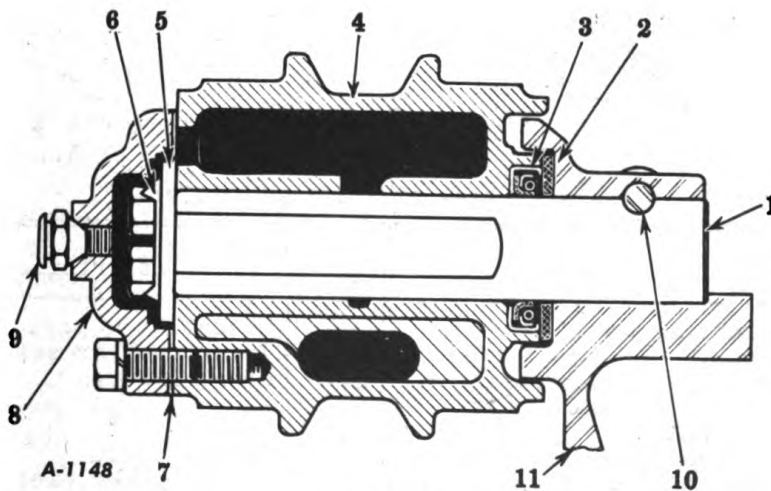
Front idlers for the track chains are slide mounted to the track frames. Tension on the track chains is adjustable at the idler, slide mounted on the guide. Two heavy coil springs on top of the track frame as shown in *Illust. 4*, "Frame", Section 6, permit the

TRACK - Continued



Illustr. 4
Exploded View of a Track Idler.

Ref. No.	Description	Ref. No.	Description
1	Idler shaft.	7	Gasket.
2	Felt washer.	8	Idler cap.
3	Oil seal.	9	Lubricator.
4	Idler, with oil seal.	10	Retainer bolt.
5	Thrust washer.	11	Support.
6	Bolt lock.		



Illustr. 5
Cross-Section of a Track Idler.

REPAIR SECTION

TRACK - Continued

Front Idler - Continued

idlers to recoil under shock but exert no tension on the track when in the normal operating position.

Removal of the Front Idlers

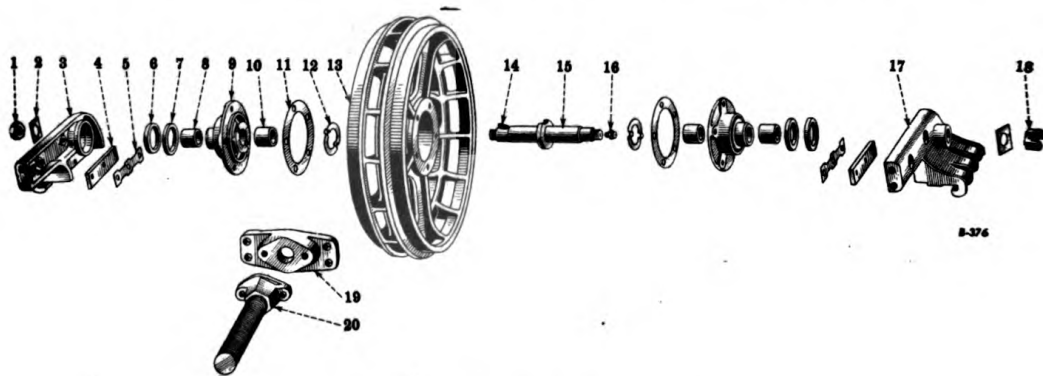
It is not necessary to remove the track frame assembly to take off the front idlers. Remove the track chain. Then remove the cap screws from the adjuster (20), *Illust. 6*, and slide the entire front idler assembly off the tractor frame.

Disassembly of the Front Idler

Both retainers (4) can be removed, if necessary, for replacement by bending back lock (5) and taking out the cap screws. Bend back the nut locks (2) on both sides and

unscrew nuts (1) and (18). The nut for the lubricator should always be placed on the outside.

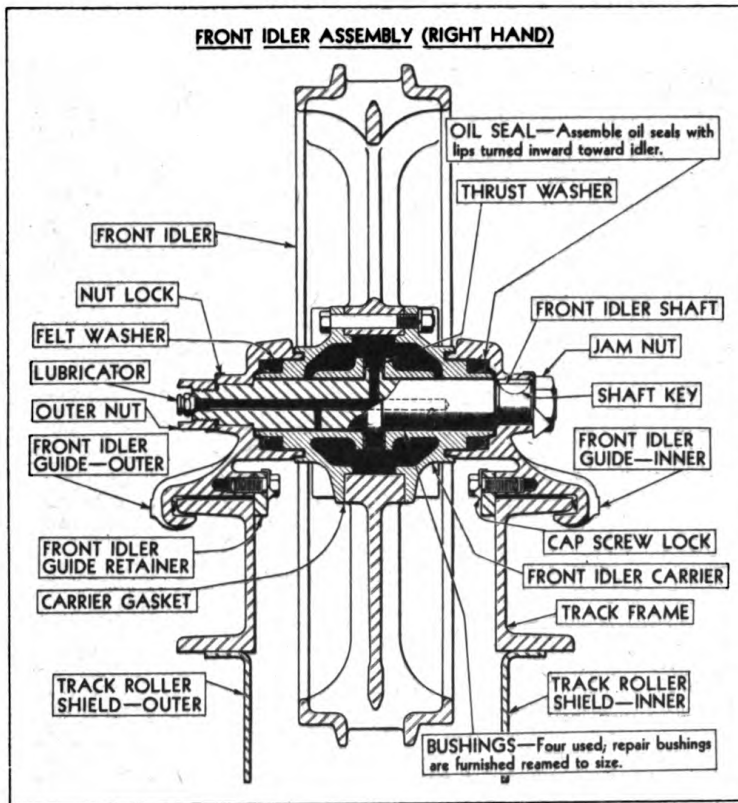
Take out the four bolts to remove the cross plate (19). The inner and outer guides (3) then may be removed to slide off shaft (15). Remove key (14). Take off the carriers (9) from the idler (13). When one of the carriers is removed, the shaft (15) slides out. Then the second carrier can be removed. The shaft diameter is 1.991-inch to 1.992-inch. The bushings are replaceable reamed to size. They should be pressed into the idler bevel first until they are flush with the inside diameter. Clearance is normally .006-inch to .011-inch. The seal (6) and felt washer (7) can then be removed from the carriers (9). In replacing the thrust washers have the



Illust. 6
Exploded View of the Front Idler.

Ref. No.	Description	Ref. No.	Description
1	Nut, inner.	11	Gasket.
2	Nut lock.	12	Thrust washer set.
3	Guide (inner, right hand - outer, left hand) with oil seal.	13	Front idler.
4	Guide retainer.	14	Key.
5	Retainer bolt lock.	15	Shaft.
6	Oil seal.	16	Lubricator.
7	Felt washer.	17	Guide (inner, left hand - outer, right hand) with oil seal.
8	Bushing set.	18	Nut, outer.
9	Carrier, with bushing.	19	Guide cross plate.
10	Bushing set.	20	Adjuster.

TRACK - Continued



Illustr. 7
Cross-Section of Front Idler Assembly.

Disassembly of the Front Idler - Continued

projections engage the slots in the carriers and be sure the surfaces are clean.

The lubricator (16) can be unscrewed from shaft (15). Before reassembling, make sure that the drilled holes for lubrication are clean.

Reassembly of the Front Idler

Reassembly is the reverse of disassembly. Be sure that the seals (6) have the leather lip facing

toward the center of the idler (13). The thrust washers (12) must engage the slots in the carriers. Be sure the surfaces are clean. Before reassembling the lubricator (16) to the shaft, be sure that the drilled holes for lubrication are clean. Be sure to use new washers (7) and new seals (6).

Replacement of the Front Idler

Replacement on the tractor is the reverse of removal. Be sure the proper adjustments are made after idlers are on the tractor to prevent them from cocking, and also to prevent the tractor from creeping to one side.

REPAIR SECTION

MEMORANDA

TRANSMISSION

<u>Gear</u>	<u>M.P.H.</u>	<u>F.P.M.</u>	<u>Gear Ratio</u>
1	1.5	132	81.0 to 1
2	2.1	185	58.2 to 1
3	2.5	220	48.1 to 1
4	3.4	299	35.3 to 1
5	4.8	422	25.3 to 1
6	5.8	510	20.9 to 1
Low Reverse	1.5	132	80.4 to 1
High Reverse	3.4	299	35.0 to 1

The transmission is of the selective spur-gear type having six forward speeds and two reverse speeds. Standard shifting is controlled by one lever while the change from the high to the low range is controlled by another lever. The gears are assembled on three shafts which are mounted in the rear main frame.

The upper spline shaft (33), *Illust. 1*, revolves on two ball bearings in cages. It is hollow to allow the power take-off to drive direct from the drive gear assembly. The bevel gear and pinion shaft (70) revolves on a straight roller bearing in a bearing cage next to the pinion. Ball bearings take the end thrust and the bearing cage is shimmed from the transmission end cover for the cone setting of the bevel gear.

The reverse idler gear revolves on two roller bearings as does the Hi-Lo gear. The rear bearing is a double-row ball bearing. "*Line of Power*", *Illust. 1*, Section 9, shows the flow of power through the transmission. The *service chart*, Section 14, shows the relation of the parts and the procedure for the removal.

Splash lubrication is provided from the constant running oil gear. The reservoir capacity is 6-1/2 gallons.

Preparation for Removal of the Transmission

Remove the seat cushion and battery covers. Remove the braided ground cable from the positive terminal of the *left* battery. Disconnect the cable between the battery, starting with the terminal of the *right* battery. Then remove the cable from the negative terminals of both batteries. The battery supports are spring-mounted and can be readily taken out when the batteries are removed.

The fuel tank and complete seat can be removed as a unit. Take off the fender brackets.

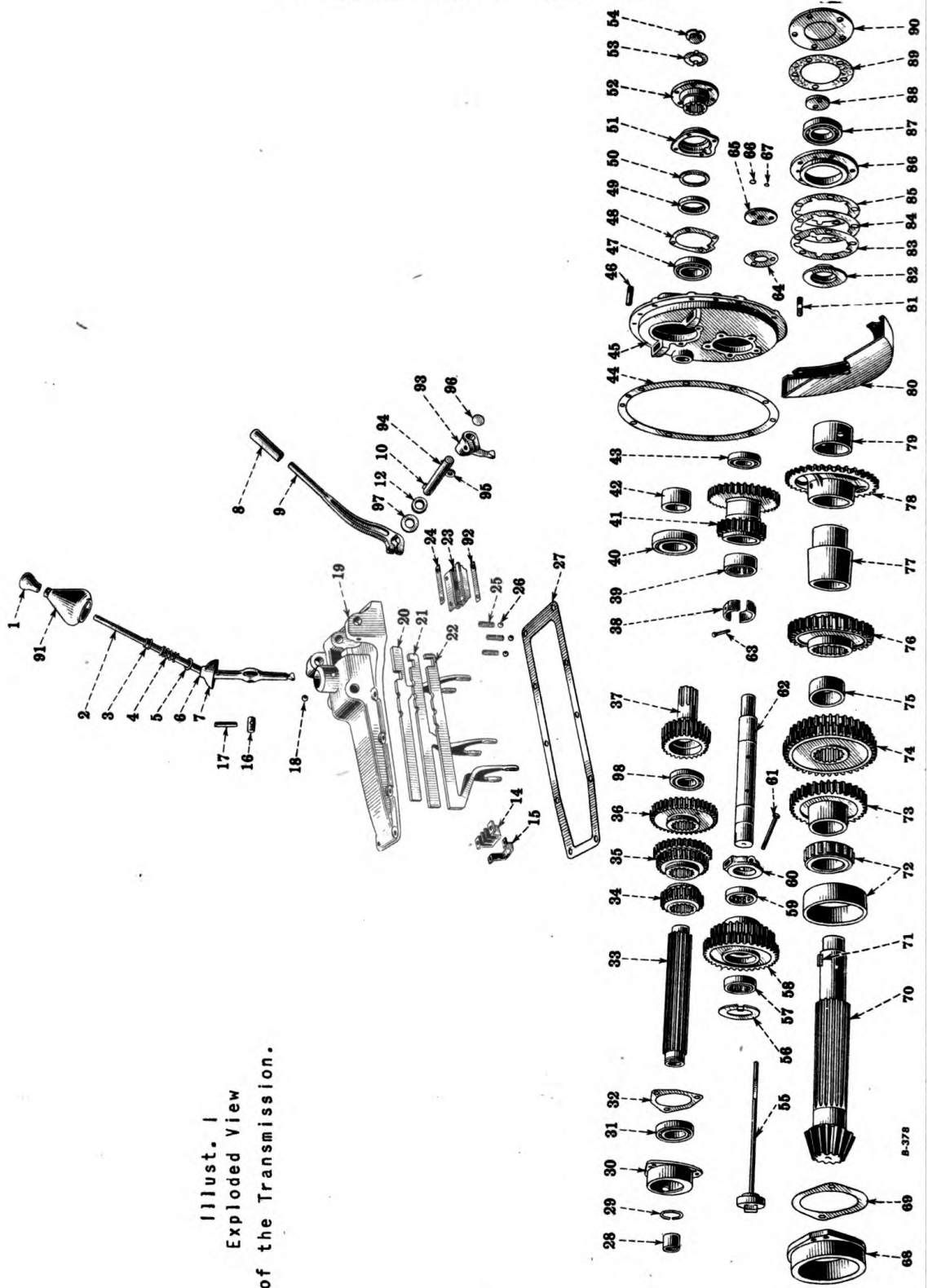
The main frame cover comes off after the following steps have been accomplished:

Remove the cap screws from around the outside edge of the main frame cover. Disconnect the electrical wiring and label all of the wires for easy replacement. Refer to the wiring diagrams in the "*Spare Parts Catalog*".

Remove the two small inspection covers to take out the bolts which hold the steering clutch grease tubes. Remove the springs, cap screws, and bolts from the steering

REPAIR SECTION

TRANSMISSION - Continued



Illustr. 1
Exploded View
of the Transmission.

TRANSMISSION - Continued

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Ball.	28	Bushing.	54	Nut.	78	Oilier gear (37 teeth).
2	Lever.	29	Snap ring.	55	Oil level rod.	79	Bushing.
3	Spring stop, upper.	30	Bearing cage, rear.	56	Thrust washer.	80	Reservoir.
4	Spring.	31	Bearing.	57	Bearing.	81	Stud.
5	Spring stop, lower.	32	Retainer.	58	Idler gear (29 and 36 teeth).	82	Spacer.
6	Bushing.	33	Spline shaft, complete.	59	Bearing.	83	Shim, heavy.
7	Swivel housing shield.	34	Gear (23 teeth).	60	Oil scoop.	84	Shim, medium.
8	Hi-Lo shifter lever handle.	35	Gear.	61	Bolt.	85	Shim, light.
9	Hi-Lo shifter lever.	36	Hi-Lo sliding gear (26 and 38 teeth).	62	Idler shaft.	86	Bearing cage.
10	Key.	37	Driving shaft gear (26 teeth).	63	Retainer bolt.	87	Bearing, front.
12	Oil seal felt.	38	Thrust collar.	64	Gasket.	88	Washer.
14	Guide, rear.	39	Bearing, rear.	65	Retainer.	89	Gasket.
15	Bolt lock.	40	Bearing.	66	Lock washer.	90	Retainer, front.
16	Shaft, large.	41	Hi-Lo gear (21 and 33 teeth).	67	Retaining bolt washer.	91	Gear shifter boot.
17	Shaft, small.	42	Spacer.	68	Bearing cage, rear.	92	Bolt lock, right hand.
18	Plug.	43	Bearing.	69	Retainer.	93	Hi-Lo gear shifter arm.
19	Housing.	44	Gasket.	70	Bevel pinion and shaft with drive bevel gear.	94	Hi-Lo gear shifter arm shaft.
20	Hi-Lo shifter rail.	45	End cover.	71	Key.	95	Hi-Lo gear shifter arm key.
21	Second and third shifter rail.	46	Dowel.	72	Roller assembly and outer race.	96	Hi-Lo gear shifter arm shaft plug.
22	Low and reverse shifter rail.	47	Bearing, front.	73	Reverse gear (32 teeth).	97	Shaft washer.
23	Guide, front.	48	Gasket.	74	Oil seal.	...	Gear shifter boot clamp.
24	Bolt lock, left hand.	49	Felt washer.	75	Retainer.	98	Transmission spline shaft bearing, front.
25	Poppet spring.	50	Retainer.	76	Driving flange.		
26	Poppet ball.	51	Driving flange.	77	Nut lock.		
27	Gasket.	53	Nut lock.				

TRANSMISSION - Continued

Preparation for Removal of the Transmission - Continued

clutch release levers. Then remove the cap screws from the steering clutch release fork bearing retainer. Lift the levers and the retainer off the tractor.

Take out the cap screws holding the shifter housing (19) to the main frame cover. Lift the housing assembly with the gasket (27) from the cover. Three dowel pins line up the cover on the main frame and are removed with the aid of a nut on their threaded top. When the pins are out, the main frame cover can be lifted out. If the steering clutch release fork bearing cages stick in the cover, they can be tapped out of place and set back on the release forks. The engine clutch must be removed before the transmission is removed. This is covered in Section 4.

The rear power take-off is removed as described in Section 8.

Removal and Disassembly of the Transmission

Drain the oil from the transmission. The transmission front cover (45), *Illust. 1*, is removed through the engine clutch compartment. Bend back lock (53) and remove the special nut (54) in the end of the transmission drive shaft (37). Slide the flange (52) from the shaft (33).

Remove the cap screws from around the outside edge of the front end cover. The bearing retainer (90) for the bevel gear and pinion shaft (70) comes out after removing the cap screws. Then take the cap screws from the bearing retainer washer (88) for the bevel gear and pinion shaft. The retainer (65) for the idler shaft (62) should then be removed. Three dowel pins (46) in the cover (45) have threaded

heads for easy removal. Assemble puller cap screws to the tapped holes in the cover (45). Run them up evenly and lift out the cover assembly (51) to (47) and (45) to (37) and also from (87) to (83). The gasket (44) will ordinarily stick to the cover.

To disassemble drive shaft (37) from the cover, remove the bearing retainer (51). Use a babbitt hammer and drive the shaft (37) to the rear of the cover. Bearings (40) and (47) and the spacer (42) can then be removed from the cover. The bearing cage (86) for the bevel gear and pinion shaft (70) can then be taken out of the cover. Shims (83), (84), and (85) fit between this bearing cage and the cover and are used for obtaining the proper tooth setting of the pinion shaft with the ring gear. Bearing (87) can then be removed from the cage (86).

With the cover (45) removed, the front spacer (82) can be lifted off the pinion shaft (70). The gear (78) can also be slid off sleeve (77).

Then remove the cap screws from the rear bearing cage (30). The upper spline shaft (33) with gears (36), (35), and (34) and the bearing (31) can then be pulled out as an assembly. The gears can then be slid from the shaft. Removal of the snap ring (29) permits bearing (31) and the rear retainer (32) to be removed from the shaft. The bushing (28) can be removed if necessary for replacement.

The idler shaft assembly (62) comes out easy. Remove the nut bolt in the rear bearing retainer (38). Push the Hi-Lo gear (41) to the rear. Pry behind the reverse idler gear (58) and the entire assembly can be moved forward out of the main frame. The Hi-Lo gear can then be removed from the idler shaft. The bearings (39) and (43) can be removed from the gear if they are to be replaced.

TRANSMISSION - Continued**Removal and Disassembly of the Transmission - Continued**

Remove bolt (61) from the oil scoop (60) and pull the assembly (60) and (58) from the shaft. This will free bearings (59) and (57). The bevel gear and pinion shaft (70) can be removed after taking out the cap screws in the rear bearing cage (68). The sleeve (77) can be pulled out the shaft. Gears are keyed and pressed on the shaft and can be removed with the aid of an arbor press. The bearing (72), retainer (69), and the bearing cage (68) will then come off. The spacer (75) is used between the gears (73) and (74).

Shifter gears (36), (35), and (34) operating on the upper spline shaft (33) should be free enough to slide along the shaft but should not have any perceptible play in the direction of rotation. A good fit between the spline of the gear and that of the shaft is important.

Shifter forks attached to the shifting housing (19) can be removed for replacement. This can be done by removing bolts from the shifter rail guides (14) and (23). Both poppets (26) and springs (25) are freed from the housing (19). The Hi-Lo shifter lever shaft assembly can be removed by taking out the bolt in the lever, pulling off the lever, and pushing the shaft into the housing (19). Replace the seal (12). The lever (2) can be removed by taking plugs (18) from the housing (19) and pushing the pin (17) out of the housing.

Reassembly and Replacement of the Transmission

Reassembly and replacement of the transmission shafts and gears can be accomplished by reversing the

disassembly procedure. Use all new gaskets and oil seals when doing so. Thoroughly clean the assembly and the case before replacing the main frame cover. Refer to the *service chart*, Section 14, for the relative positions of the gears.

Replace the oil seal (49), *Illust. 1*, in reassembling, being sure to have the lip of the leather seal facing the transmission gears.

Replacement bushing (79) for the gear (78) is furnished reamed to size and need only be pressed into place. The inside diameter of the bushing is 2.878-inch to 2.882-inch giving a .003-inch to .008-inch clearance.

When replacing the idler shaft (62) be sure that the tang of washer (56) enters the small hole in the main frame. The bevel gear and pinion shaft (70) are properly located in the main frame from front to rear when a 5/8-inch (.625-inch) gauge will slide freely between the end of the pinion and the ring gear hub. Shims (83), (84), and (85) are used to obtain this setting. Remove the shims between the bearing cage (86) and the front end cover (45) to reduce the gap between the end of the pinion and the ring gear hub.

After properly setting the pinion, draw all the cap screws tight and recheck. Then check the gears for backlash and adjust them as outlined under the heading "*Drive Bevel Gear*", Section 5.

Replace all other items previously removed.

REPAIR SECTION

MEMORANDA

REPAIR SECTION

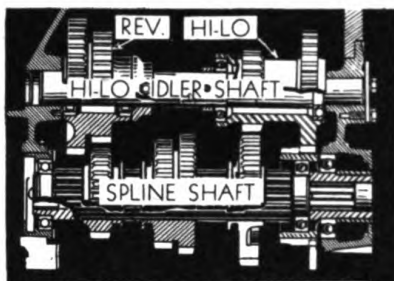
TOLERANCES AND CLEARANCES

NOTE: All tolerances and clearances not found in the Service Charts will be found in the text under the various headings.

OIL SEALS

NOTE: Whenever an oil seal is removed from the tractor, always replace it with a new seal.

When installing new oil seals, check to see that the leather is pliable and the edges are in good condition to assure a tight fit, preventing oil leakage. Inspect the metal surfaces in contact with the oil seal to make sure they are smooth; roughness will cause rapid wear of the seal and consequent oil leakage.



TOP VIEW OF TRANSMISSION

TRANSMISSION: To disassemble, it is easiest if seat frame, fenders, fuel tank, gear shifter housing, steering clutch controls, engine clutch cover, and engine clutch with coupling are all removed. Then remove from engine clutch compartment: the coupling flange and oil seal retainer from upper shaft, the bearing cage from lower shaft with puller cap screws and bearing retainer washer, and retaining plate from Hi-Lo shaft. Remove transmission front cover with puller cap screws ($3-\frac{1}{2} \times 2\frac{3}{4}$ " threaded well back to the head. Pull gears from their respective spline shafts, and pull out Hi-Lo shaft as unit with gears attached. Remove cap screws from rear bearing cages of both shafts and drive or pry out from the rear. Assemble transmission by reversing the above procedure. Bevel gear and pinion should show a toe bearing (small end of tooth, centered top to bottom) with approximately .012" backlash.

FUEL TANK may be removed together with fenders and seat. Capacity, 45 U. S. Gallons.

POWER TAKE-OFF
Shaft passes through
shaft and drives in
transmission driving

GEAR SHIFTER HOUSING
can be removed as a unit with
gear shifter levers and forks and
steering clutch levers all in place.

SEAT

TRACK ASSEMBLY:
Tracks are interchangeable.

DRAWBAR

PIVOT SHAFT: Locked in position
with a dog point setscrew under
main frame.

TRACK FRAMES are removable
as a complete unit. First
remove front stabilizer, then
bolts from diagonal brace and
from ball socket on pivot shaft.

STEERING CLUTCH RELEASE FORK:
Assemble lower bearing cage and bearing
into main frame. Assemble link pins to
fork, insert cotter pins and bend over the
uppermost and lowest cotter pins. Insert
fork into main frame, pull out loose link
pins, insert links onto collar and into fork,
bend over cotter pins with rod through holes
in rear of main frame. For further details,
see section on steering clutches.

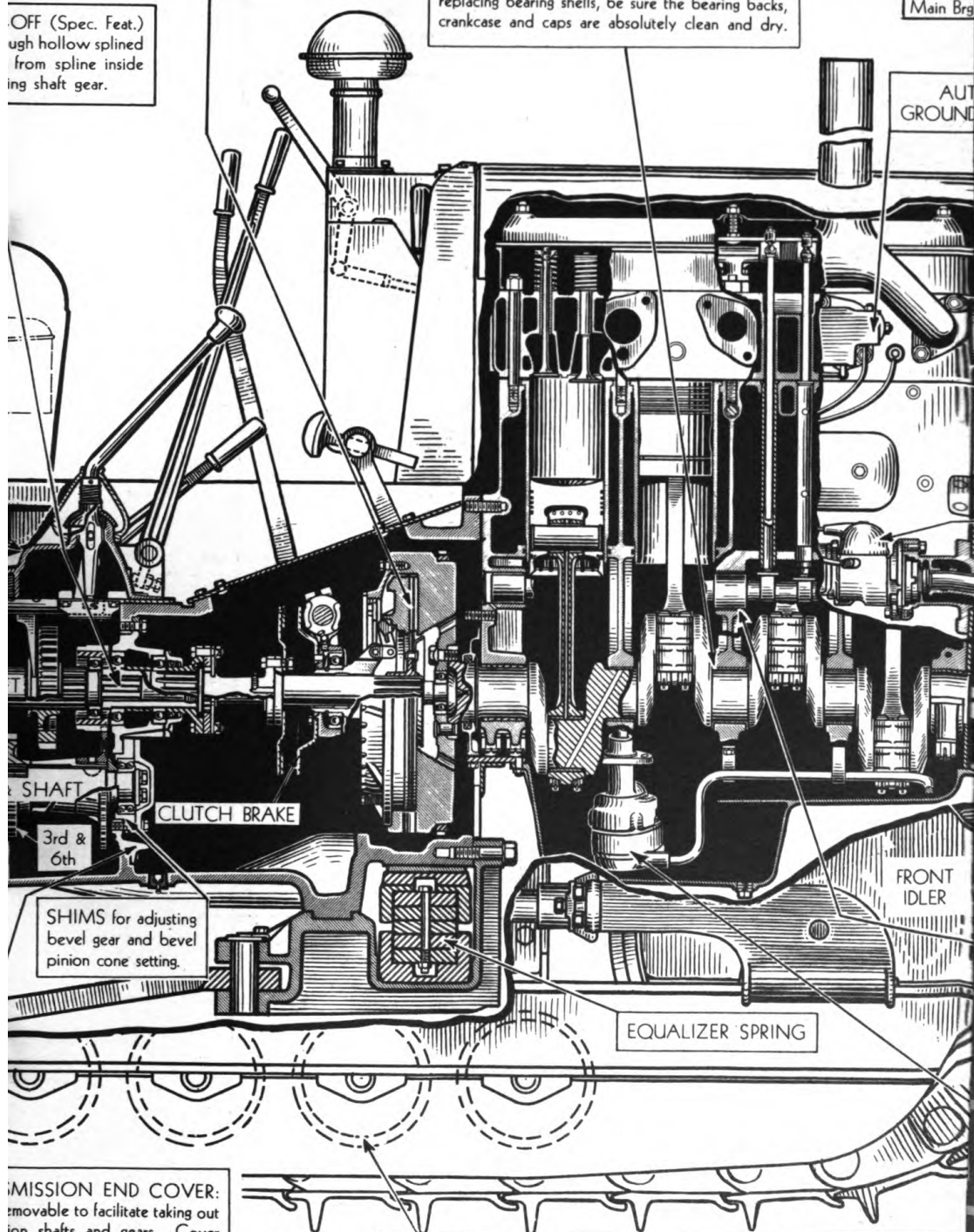
TRANSA
Cover rem
transmission
can be re
cover-ope
screws
in tapped
cover/loc

ENGINE CLUTCH: 15", over-center type. Readily removed and replaced as a unit without disturbing engine or transmission. To adjust clutch, refer to Instructions in this manual.

MAIN BEARINGS: 5 precision type; vertical running clearance .003 to .004"; end clearance .006 to .014"; thrust taken on center bearing. Bearings can be replaced without removing crankshaft. Replacement crankshaft and bearings are available in $\frac{1}{32}$ " undersize. NOTE: When replacing bearing shells, be sure the bearing backs, crankcase and caps are absolutely clean and dry.

Bolt To	(Ft.-Lbs.)
Cyl. Head	
Conn. Rod	
Flywheel	
Main Brg	

OFF (Spec. Feat.)
ough hollow splined
from spline inside
ing shaft gear.



TRANSMISSION END COVER: Removable to facilitate taking out ion shafts and gears. Cover removed through engine clutch opening. Use $3\frac{1}{2} \times 2\frac{3}{4}$ " cap threaded well back to the head, d holes provided, to push end ose.

TRACK ROLLERS are press mounted on cast carriers which are fitted with four bronze bushings. Bushings, reamed to size, are available for repairs. Replace bushings before carriers start to wear. With track roller assembly removed from track frame, remove snap ring from each side, support roller on press and push on shaft, forcing carrier out. Turn over and push remaining carrier out. Replace new carrier bearings and assemble parts in reverse of removing procedure.

Torque Data (Torque)	
d	190
d	70
	150
	150

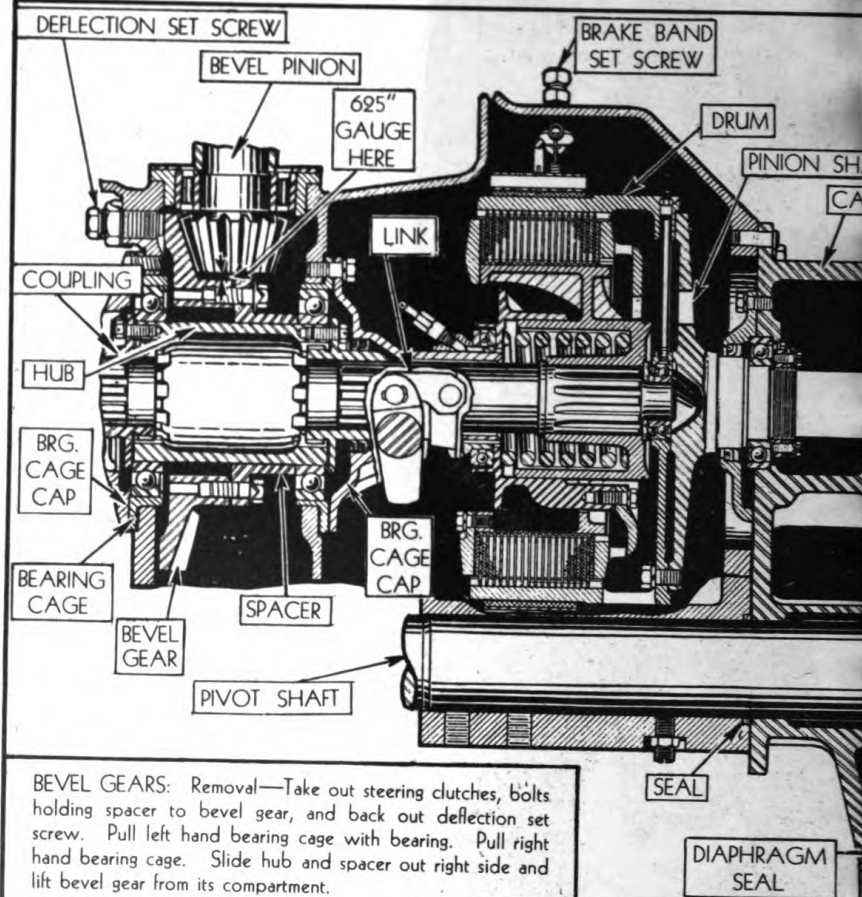
OMATIC
ING SWITCH



Oil
one
sur
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ang
pre

STEERING CLUTCHES: Removal—Clear top of main frame of seat, batteries, controls, etc., and lift off main frame cover. Loosen brake band adjuster and remove pin from rear brake band. Remove grease tubes and pins in release fork. Turn release fork, remove links and lift out release fork. Remove capscrews and slide bearing cage cap into the steering clutch. Assemble clutch compressor angle tools (58920-D) to the clutch and compress. Remove capscrews from clutch drum and clutch coupling. Mark drum and pinion flange, pry coupling into bearing cage cap and lift unit out of main frame.

Replacement: Revers should be attached to a new oil seal in bea Be sure socket head s flange with several c bevel gear hub. Co long rod inserted th bearing cage cap a adjust hand lever fre



BEVEL GEARS: Removal—Take out steering clutches, bolts holding spacer to bevel gear, and back out deflection set screw. Pull left hand bearing cage with bearing. Pull right hand bearing cage. Slide hub and spacer out right side and lift bevel gear from its compartment.

Reassembly—Press left hand bearing into its bearing cage. The bearing has an outer race that is narrower than its inner race. Flush side of bearing races is always to the left. Press left bearing cage and bearing onto left end of bevel gear hub. Attach steering clutch coupling to left end of hub. Lower bevel gear and press bearing cage into the main frame. Attach bearing cage cap to main frame. Slide spacer over hub from the right side, assemble right bearing to right bearing cage and secure unit to hub and main frame. Be sure left side of bearing is the flush side of the bearing races as shown. Attach right clutch coupling to hub and bearing cage cap to main frame. Insert same number of shims between spacer and bevel gear as were removed at the time of disassembly, or insert shims to give .012\" backlash with an new pinion and gear.

When reassembling new pinion, place a .625\" thick gauge between the ground surface on bevel gear and the end of the pinion. Then use proper number of shims between bevel pinion bearing cage and transmission front cover to hold the gauge at this point when all bolts are tightened. Be sure backlash of bevel gear is .014\" when pinion is held stationary. Now adjust deflection set screw on left side to have .020\" clearance between it and back face of bevel gear. Replace steering clutches.

SPROCKET DRIVE: Removal—Take off track jack under tractor, remove from pivot bearing, jack tractor, and remove sprocket pivot bracket cap. Take off ing and pivot bracket with seal. Remove bearing r dust seal and use puller c remove sprocket bearing c ing. Service tool SE-118 used to turn off sprocket Sprocket can now be Replacement is the reverse going.

Sprocket Drive Gear Rem off sprocket, as above, and bearing cap. Use puller c remove the outer gear h

TracTractor Model TD-14

SPARE PARTS CATALOG

The major units of the tractor are arranged alphabetically, in sections, in this parts list and are numbered consecutively, as shown at the right.

Each section has a black tab which lines up with the corresponding section at the right. The black tabs are quickly located by bending this book back.

The contents of each section can be determined at a glance by referring to the index on the other side of this page.

**CONTROLS
AND DASH**

1

COOLING SYSTEM

2

**ELECTRICAL
AND MAGNETO**

3

ENGINE

4

ENGINE CLUTCH

5

FINAL DRIVE

6

FRAME

7

FUEL SYSTEM

8

POWER TAKE-OFF

9

**SEAT AND
FENDERS**

10

**STARTING
MECHANISM**

11

**STEERING
MECHANISM**

12

TRACK

13

TRANSMISSION

14

MISCELLANEOUS

15

SPARE PARTS CATALOG

CONTENTS

CONTROLS AND DASH

Control levers	1
Indicators	1

COOLING SYSTEM

Fan	2, 3
Radiator and connections	1
Thermostat	2, 3
Water pump	2, 3

ELECTRICAL AND MAGNETO

Batteries	12
Electric starting and lighting unit	8 to 9
Generator	5
Head lamp (detail parts)	10
Light switch (detail parts)	11
Magneto	1, 2
Magneto drive	3
Rear lamp (detail parts)	10
Spark plug cables	4
Starting motor	8
Wiring diagram of starting and lighting attachment	6, 7

ENGINE

Air cleaner and connections	16, 17
Camshaft	2 to 4
Crankcase	6 to 8
Crankcase guard	5
Crankcase oil pan	6 to 8
Crankshaft	10 to 12
Cylinder head	2 to 4
Cylinder sleeves	10 to 12
Exhaust muffler	14
Flywheel	10 to 12
Front pull hook	5
Fuel oil filter	18
Lubricating oil filter	13
Lubricating oil pump	9
Manifolds, intake and exhaust	14, 15
Pistons	10 to 12
Spark plug	2 to 4
Starting crank	19
Valves	2 to 4

ENGINE CLUTCH

Engine clutch and connections	1, 2
Engine clutch operating lever	2

FINAL DRIVE

Drive bevel gear	1
Sprocket drive assembly	2 to 4

FRAME

Diagonal brace	9
Drawbar and brackets	10
Equalizer spring	6, 7
Main frame	2, 3
Rigid track frame	8
Side channels	1
Track frame and springs	4, 5
Track frame guide	1

(Continued on next page.)

SPARE PARTS CATALOG

FUEL SYSTEM

Page No.

Carburetor.....	6, 7
Fuel piping diagram.....	2, 3
Fuel tank.....	2, 3
Gasoline tank.....	2, 3
Gasoline strainer.....	4
Injection nozzle and pipes.....	9
Injection pump and connections.....	10
Injection pump (detail parts).....	11 to 20
Primer and connections.....	8
Water trap.....	5

POWER TAKE-OFF

Front power take-off coupling unit.....	1
Rear power take-off attachment (50908D).....	2

SEAT AND FENDERS

Fenders.....	2, 3
Seat.....	2, 3
Seat cushions.....	2, 3
Foot rests.....	2, 3

STARTING MECHANISM

Cross shaft and governor control.....	1
Engine control and connections.....	2
Starting valves and shaft.....	3

STEERING MECHANISM

Steering brakes and controls.....	4, 5
Steering clutch and release mechanism.....	2, 3
Steering clutch operating levers.....	1

TRACK

Front idler.....	1
Front idler shield attachment.....	2
Track idler.....	4
Track link pin and shoe assembly.....	5
Track roller assembly.....	3

TRANSMISSION

Gear shifter lever.....	1
Hi-Lo shifter lever.....	1
Oil level rod.....	2
Transmission.....	1, 2

MISCELLANEOUS

Gasket packages.....	8
Head lamp brush guards.....	2
Hood.....	1
Hose assembly and coupler for bucket lubricator.....	6
Lincoln bucket type lubricator.....	4, 5
Lincoln hand type lubricator.....	7
Lubrication guide kit.....	9
Radiator guard.....	2
Sprocket rock deflector.....	3
Tools and tool box.....	8

Revisions in QMC Form 400 for requisitioning spare parts are confined to new column headings. Until new forms are available all organizations will use the present form and type or write in corrections indicated.

Under revised heading "Nomenclature and Unit" list the article and the unit (ea for each; lb for pound; etc.). Under heading "Maximum or Authorized Level" list the authorized organizational allowances or depot stock levels given in ENG 7 and ENG 8 of the ASF Engineer Supply Catalog (superseding Part III, Corps of Engineers Supply Catalog). The total number on hand for each item is listed under "On Hand". In column headed "Due In" enter the total quantity previously requisitioned but not delivered. Column headed

"Required" is to be changed to read "Quantity Desired." In "Remarks" column enter additional information. For "Initial" and "Replenishment" requisitions, the sum of "Quantity Desired", "Due In", and "On Hand" should equal "Maximum or Authorized Level".

On this page is shown a sample requisition on QMC Form No. 400 which conforms to the latest revisions. The marginal notes give instructions for preparing a requisition for spare parts for Engineer equipment. Additional information on this subject is contained in Section ENG 1-2 of the ASF Engineer Supply Catalog (superseding Section AA-1 of Part III Engineer Supply Catalog), available on requisition from Engineer Field Maintenance Office, P. O. Box 1679, Columbus, Ohio.

State PERIOD designation by use of one of the following terms:

- (1) "INITIAL"—first requisition of authorized allowances.
- (2) "REPLENISHMENT"—subsequent requisitions to maintain authorized allowances.
- (3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.

Type "SPARE PARTS" in upper right hand corner of requisition.

Give complete shipping instructions. Special instructions for packing, marking, routing, etc., should be given at the end of requisition.

State proper nomenclature of machine, also make, model, machine serial number and U. S. A. registration number.

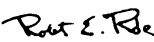

Prepare a separate requisition for each different machine.

State basis or authority and date delivery is required, immediately below description of machine.

Double space between items.

Group parts required under group headings as shown in manufacturers parts catalogs (Technical Manuals).

State stock numbers, manufacturers' parts numbers and nomenclature accurately and completely. Do not use abbreviations.

WAR DEPARTMENT Q. M. C. Form No. 400									
REQUISITION									
To: Engineer Field Maintenance Office, P. O. Box 1679, Columbus, Ohio						No. of Sheets 1		Sheet No. 1	
Requisition No. E-531-144						Date 15 November 1943		Period Replenishment	
SHIP TO Engineer Property Officer, Pine Camp, New York									
MAILED FOR: Supply Officer, 149th Engineer Regiment, Pine Camp, New York									
Requisitioned By (show Signature, Rank, Organization, Destination If different from "Ship to" include address):						for the Commanding officer			
 Robert E. Roe, Major, C.E., Engineer Property Officer.						 John F. Doe, Colonel, C.E., Executive Officer.			
STOCK NO.	NOMENCLATURE	UNIT	MAX OR AUTH LEVEL	ON HAND	DUE IN	QUANTITY DESIRED	REMARKS		
PARTS FOR TRACTOR, CRAWLER TYPE (74-inch TREAD) DIESEL, INTERNATIONAL HARVESTER MODEL TD-14									
Basis: to complete Second Echelon Set									
Delivery requested by 20 April 1944									
ENGINE GROUP									
55401 DX	Crankshaft with gear nut	ea.	5	2	0	1			
32509 D	Gasket	ea.	8	2	0	6			
FINAL DRIVE GROUP									
64493 D	Pinion (15 teeth)	ea.	4	1	0	3			
STEERING MECHANISM GROUP									
8679 DA	Release lever	ea.	5	2	0	1			
63228 D	Yoke (left hand thread)	ea.	3	1	0	2			
COMMON SUPPLIES									
Q 1818	Cap screw, 3/8" N.C.x3"	ea.	12	6	0	6			
*Nonexpendable items such as tools must be accounted for, when requisitioned, by a statement that they have been placed on REPORT OF SURVEY or STATEMENT OF CHARGES.									

Emergency requisitions sent by telephone, telegraph or radio must always be confirmed immediately with requisition marked: "Confirming (state identifying data)."

PREPARATION OF REQUISITIONS

Sample Copy for Use in the Preparation of Requisitions

A sample requisition in the correct form for submission by the Engineer Property Officer is shown on the opposite page.

THIS SHALL BE FOLLOWED IN MAKING OUT REQUISITIONS

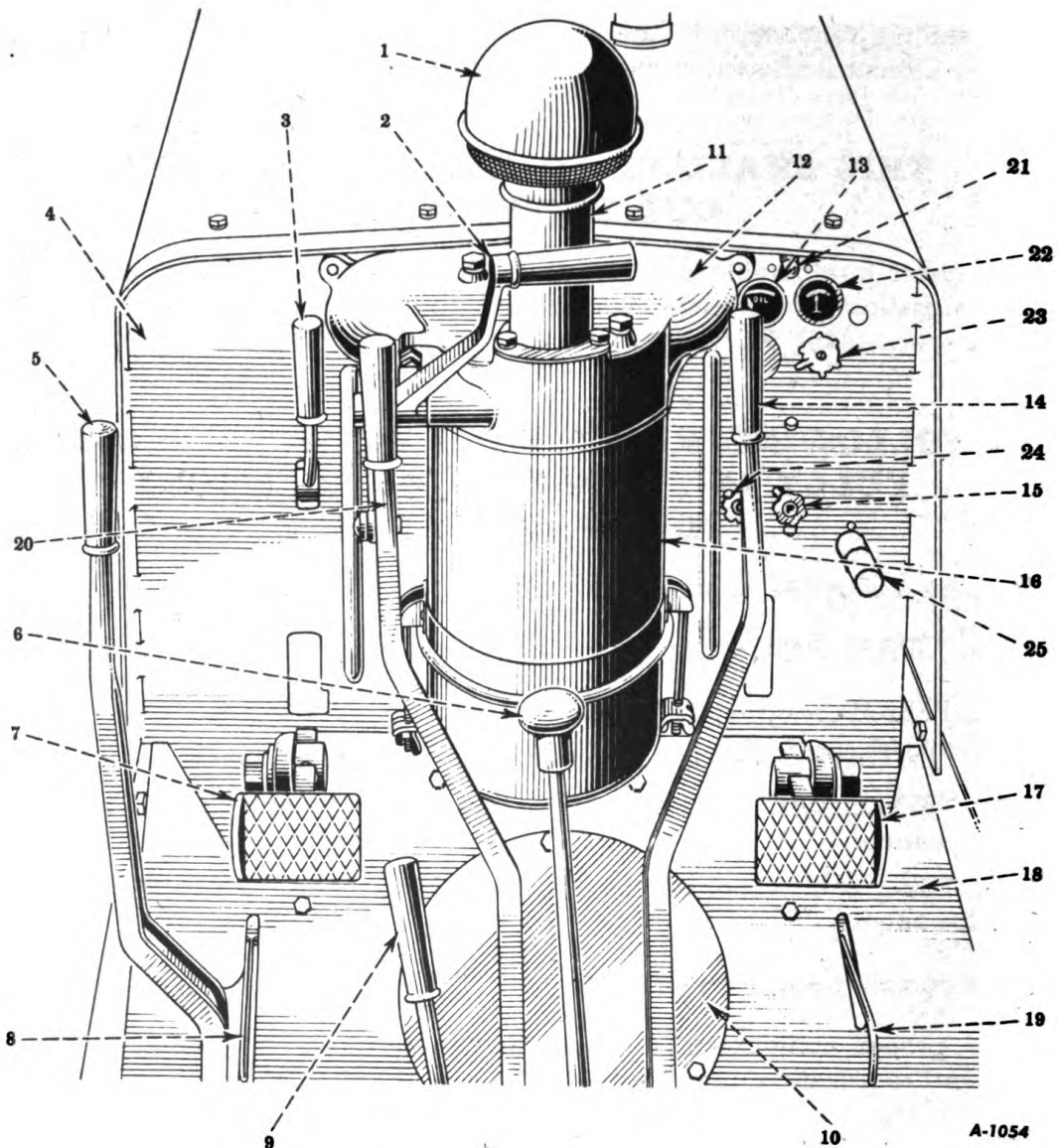
In order to eliminate duplication of work, Property Officers may authorize organizations to prepare requisitions in final form, leaving requisition number space blank for completion by Property Officer.

THE FOLLOWING RULES WILL BE OBSERVED CARE- FULLY IN PREPARING REQUISITIONS FOR SPARE PARTS:

- a. Prepare a separate requisition for each different machine.
- b. Type "SPARE PARTS" in upper right hand corner of requisition form.
- c. State PERIOD designation by use of one of the following terms:
 - (1) "INITIAL"—first requisition of authorized allowances.
 - (2) "REPLENISH"—subsequent requisitions to maintain authorized allowances.
 - (3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.
- d. Give complete shipping instructions.
- e. State proper nomenclature of machine, and make, model, serial number and registration number.
- f. State basis or authority and date delivery is required, immediately below description of machine.
- g. Group parts required under group headings as shown in manufacturers' parts catalog.
- h. State manufacturers' parts numbers and nomenclature descriptions accurately and completely. Do not use abbreviations.
- i. Double space between items.
- j. Emergency requisitions sent by telephone, telegraph, or radio, must always be confirmed immediately with requisition marked: "**Confirming** (state identifying data)."
- k. Nonexpendable items must be accounted for.

SPARE PARTS CATALOG

CONTROLS AND DASH



A-1054

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	.....	Air intake cap. (Refer to page 16, Section 4)	1	.....
2	.....	Governor control lever. (Refer to page 2, Section 11)	1	.....
3	.....	Compression release lever. (Refer to page 2, Section 11)	1	.....
4	52408 DC	Dash and cowl assembly.	1	40.000
...	Q 1860	Cap screw, 1/2" N.C. x 2-1/2"	2	.203
...	Q 1922	Lock washer, 1/2"	2	.013
5	.....	Engine clutch lever. (Refer to page 2, Section 5)	1	.....

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

CONTROLS AND DASH - Continued

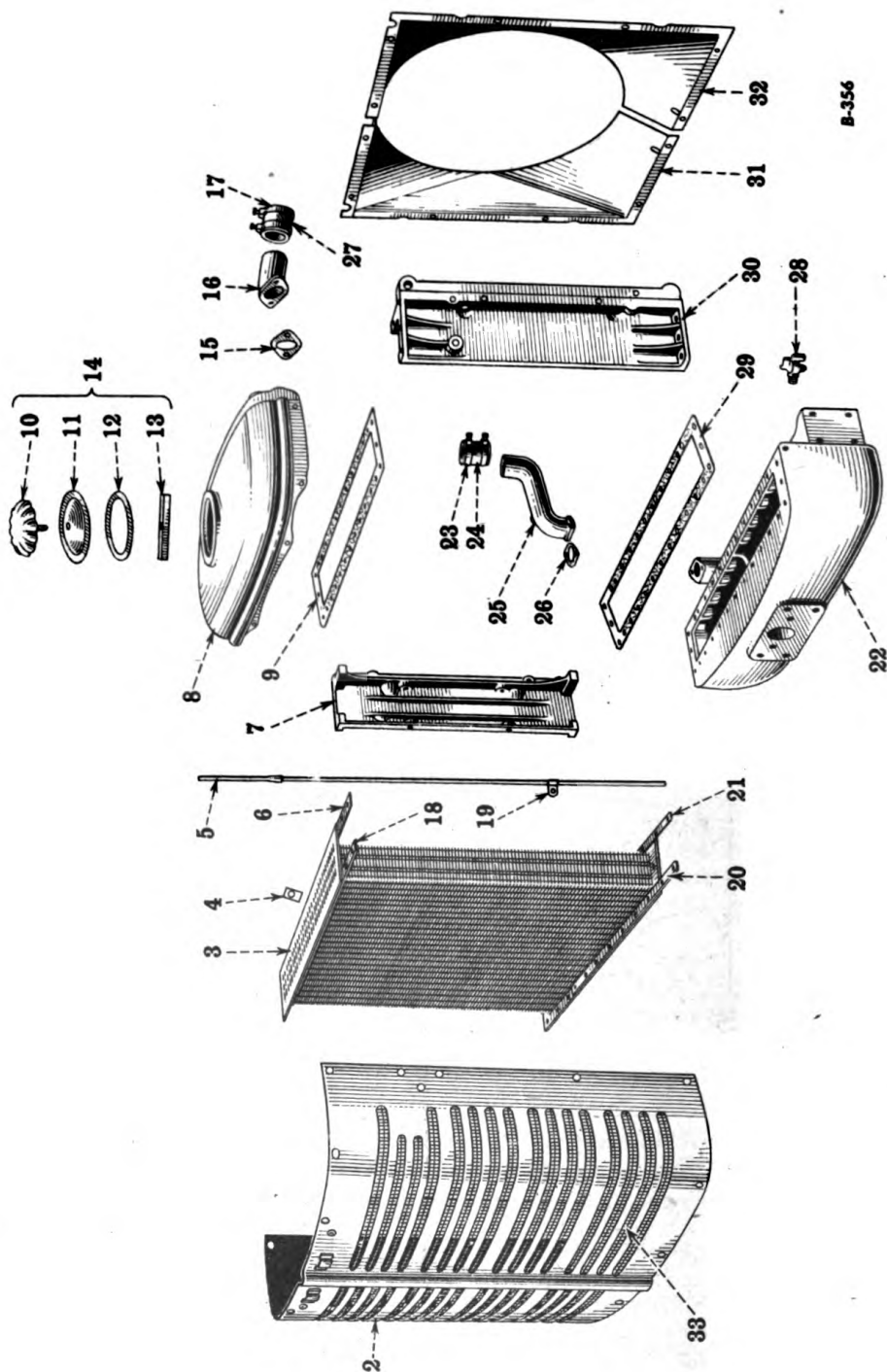
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
6	.....	Gear shifter lever (Refer to page 2, Section 14)	1	.....
7	.....	Brake pedal pad. (Refer to page 4, Section 12)	1	.....
8	.....	Brake lock. (Refer to page 4, Section 12)	1	.....
9	.....	Hi-Lo gear shifter lever, (Refer to page 2, Section 14)	1	.....
10	42547 D	Engine clutch inspection cover.	1	4.313
...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	3	.047
...	Q 1920	Lock washer, 3/8"	3	.005
11	.....	Air pipe. (Refer to page 16, Section 4).	1	.....
12	.....	Control housing and air cleaner top (Refer to page 16, Section 4).	1	.....
13	.....	Oil pressure indicator (see Detail List below)	1	.....
14	.....	Steering clutch hand lever, right hand. (Refer to page 3, Section 12)	1	.....
15	.....	Primer control rod. (Refer to page 2, Section 11)	1	.....
16	.....	Air cleaner, (Donaldson - 9"). (Refer to page 16, Section 4)	1	.....
17	.....	Brake pedal pad. (Refer to page 4, Section 12)	1	.....
18	50117 DXA	Engine clutch cover	1	22.016
...	Q 1802	Cap screw, 3/8 x 1" N.C.	8	.047
...	Q 1920	Lock washer, 3/8"	8	.005
19	.....	Brake lock. (Refer to page 4, Section 12)	1	.....
20	.....	Steering clutch hand lever, left hand (Refer to page 3, Section 12)	1	.....
...	17793 D	Dash spacer	2	.156
21	.....	Dash lamp. (Refer to page 8, Section 3)	1	.....
22	.....	Ammeter. (Refer to page 8, Section 3)	1	.....
23	.....	Light switch. (Refer to page 11, Section 3)	1	.....
24	55752 D	Choke control rod and button.	1	.....
...	.....	Cotter, 1/16 x 3/8"	1	.....

OIL PRESSURE INDICATOR AND CONNECTIONS

I H C Part No.	Description	No. Used	Wt. Lbs.
41934 DB	Oil pressure indicator with clamp and stud washers	1	.500
29898 D	Oil pressure indicator pipe coupling elbow nut (in indicator).	1	.016
29898 D	Oil pressure indicator coupling nut (in crankcase).	1	.016
30402 D	Oil pressure indicator tube coupling elbow (in crankcase)	1	.041
30402 DX	Oil pressure indicator tube coupling elbow with nut (in crankcase)	1	.063
50772 DX	Oil pressure indicator pipe (indicator to engine)	1	.188
53031 D	Pressure indicator stud washer	2	.....
.....	Hex. nut, No. 12 - 24" N.C.	2	.003
60805 D	Pressure indicator clamp	1	.15

SPARE PARTS CATALOG

RADIATOR AND CONNECTIONS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

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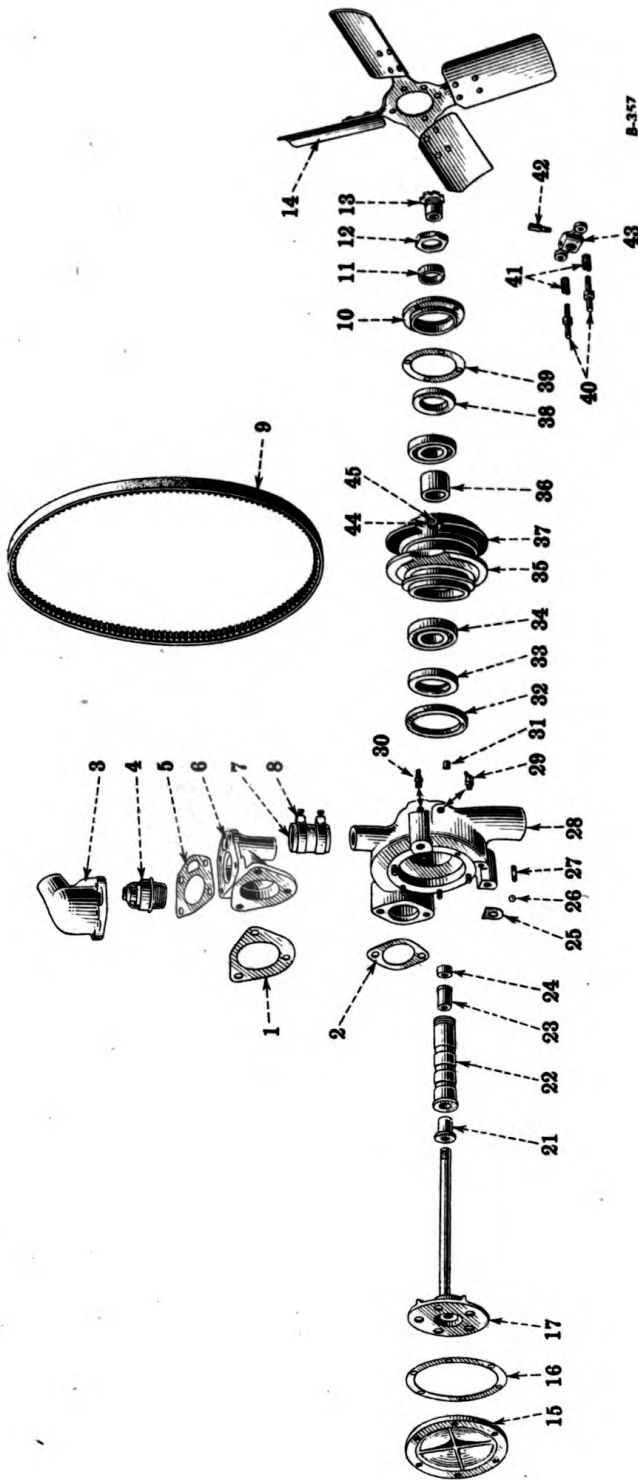
Original from
UNIVERSITY OF CALIFORNIA

RADIATOR AND CONNECTIONS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	50130 DC	Radiator, (includes Ref. Nos. 3 thru 9, 18 thru 22 and 28, 29, 30)	1	382.000	19	27307 D	Clip.	1	.031
2	50145 DA	Grille.	1	22.500	...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	1	.035
...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	16	.039	...	Q 1920	Lock washer, 3/8" . . .	1	.005
...	Q 1920	Lock washer, 3/8" . . .	16	.005	20	50137 D	Stiffener, front.	11	1.000
...	...	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 ga.	16	.025	...	Q 1802	Cap screw, 3/8 x 1" N.C.	22	.045
3	50129 DA	Radiator core	1	75.000	...	Q 1920	Cap screw, 3/8" N.C. x 1-1/8"	11	.047
4	52033 D	Overflow pipe gasket. . .	1	.001	...	50136 D	Stiffener, lower, rear. . .	1	1.500
5	50138 DX	Overflow pipe	1	.281	...	...	N.C.	9	.047
6	50135 D	Stiffener, upper, rear. . .	1	.093	...	Q 1920	Lock washer, 3/8"	9	.005
...	Q 1802	Cap screw, 3/8 x 1" N.C.	9	.001	22	6985 D	Water tank, lower	1	155.000
...	Q 1920	Lock washer, 3/8"	9	.005	23	91406 HA	Hose clamp.	2	.050
7	6988 DA	Core spacer, right hand. .	1	25.750	24	16077 D	Outlet hose (2-1/8" I.D. x 2-3/8" long)	1	.217
...	Q 1854	Cap screw, 1/2 x 1-3/4" N.C.	2	.130	25	6992 DA	Outlet elbow.	1	.320
...	Q 1852	Cap screw, 1/2 x 1-3/4" N.C. x 1-1/8"	6	.122	...	Q 1804	Cap screw, 3/8 x 1-1/4" N.C.	2	.050
...	Q 1922	Lock washer, 1/2"	8	.013	...	Q 1920	Lock washer, 3/8"	2	.005
8	6986 D	Water tank, upper	1	88.000	26	22383 D	Gasket.	1	.003
9	50126 D	Gasket.	1	.400	27	16077 D	Inlet hose (2-1/8" I.D. x 2-3/8" long)	1	.217
10	42610 D	Cap handle.	1	.750	28	42605 D	Drain cock.	1	.375
...	...	Cotter, 5/32 x 3/4"	1	.008	29	50126 D	Gasket.	1	26.500
11	5913 D	Cap cover	1	6.250	30	6987 DA	Core spacer, left hand. . .	1	.130
12	10429 D	Gasket	1	.036	...	Q 1854	Cap screw, 1/2 x 1-3/4" N.C.	2	.120
13	42158 D	Cap clamp	1	.813	...	Q 1852	Cap screw, 1/2" N.C. x 1-1/2"	6	.013
14	42611 D	Cap, with clamp, gasket and handle	1	3.625	...	Q 1922	Lock washer, 1/2"	8	.250
15	22383 D	Gasket.	1	.006	31	50140 D	Fan housing sheet, right hand	1	.039
16	6990 D	Inlet elbow	1	1.500	...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	5	.005
...	Q 1804	Cap screw, 3/8 x 1-1/4" N.C.	2	.050	...	Q 1920	Lock washer, 3/8"	5	4.250
...	Q 1920	Lock washer, 3/8"	2	.005	...	Q 50139 D	Fan housing sheet, left hand	1	.039
17	91406 HA	Hose clamp.	2	.050	...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	6	.005
18	50137 D	Stiffener, front	11	.045	...	Q 1920	Lock washer, 3/8"	6	.063
...	Q 1802	Cap screw, 3/8 x 1" N.C.	22	.005	33	50134 D	Radiator repair tube. . . .	As req.	.750
...	Q 1920	Lock washer, 3/8"	11	.047	...	50144 D	Radiator grille screen. . .	1	

SPARE PARTS CATALOG

WATER PUMP, FAN, AND THERMOSTAT



Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	57245 D	Water pump (includes Ref. Nos. 2 and 10 thru 45).	1	32.000	28	6963 DX	Body, with plug and studs	1	15.000
1	32569 D	Gasket	1	.006	...	Q 4043	Cap screw, 1/2" N.C.	2	.218
2	30824 D	Gasket	1	.008	...	Q 1862	Cap screw, 1/2" N.C.	1	.185
3	6965 DX	Thermostat housing	1	9.750	...	Q 1922	Lock washer, 1/2"	4	.014
...	Q 1804	Cap screw, 3/8" N.C.	4	.063	...	{ 14187 DA	Lubricator (Alemite No. 1611) (optional)	1	.003
...	Q 1920	Lock washer, 3/8"	4	.007	29	Q 3625	Lubricator (Lincoln No. 5100) (optional)	1	.312
...	.....	Pipe plug, 1/4"	1	.031					

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

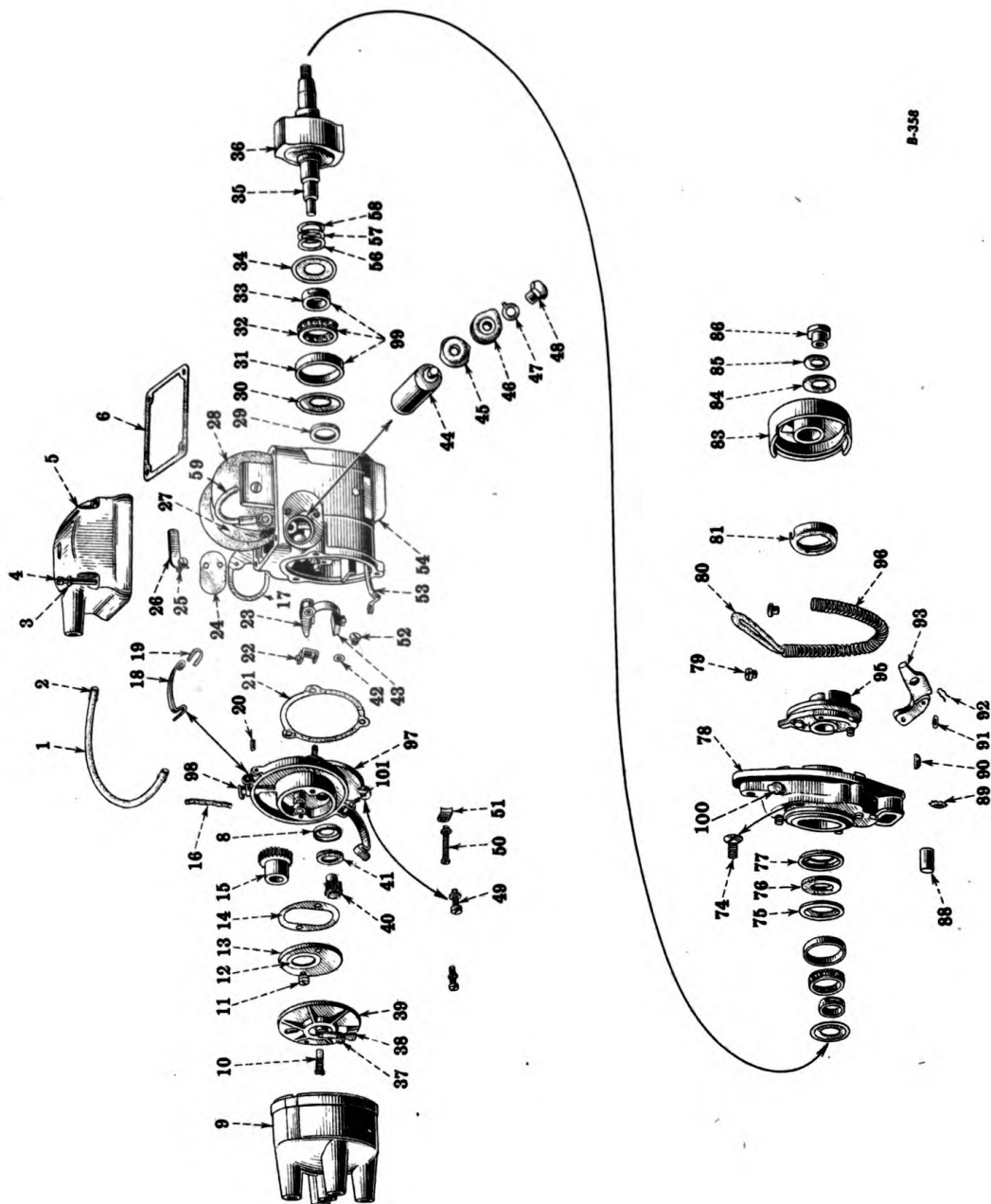
WATER PUMP, FAN, AND THERMOSTAT (Continued)

4	33814 D	Thermostat (165° - 190°) (optional)	1	24	50790 D	Packing	1	.020
	37634 D	Thermostat (165° - 190°) (optional)	1	25	32349 D	Body Spacer	2	.003
5	50273 D	Gasket	1	26	18196 D	Plug	1	.001
6	6964 D	Outlet elbow	1	27	11657 D	Body stud	6	.063
...	Q 1850	Cap screw, 1/2" N.C. x 1-1/4"	1	30	QA 3628	Lubricator, complete with cap (Lincoln No. A-5575) (optional)	1	.312
...	Q 1922	Lock washer, 1/2"	3	31	Q 3659	Lubricator cap (Lincoln No. 5560) (optional)	1	.312
7	27648 D	Hose (1-5/8" I.D. x 2-3/8" long)	3	32	20300 D	Felt washer	1	.060
8	91406 HA	Hose clamp	1	33	20290 D	Oil seal, rear	1	.437
9	30982 D	Fan belt	2	34	20308 D	Bearing (optional) (New Departure No. 3207)	2	.687
10	20306 DX	Bearing retainer	1	35	ST 205 A	Bearing (optional) (IHC)	2	.687
11	20293 D	Bearing lock sleeve	1		8023 DX	Pulley hub, with oil seal	1	5.781
12	20299 D	Nut	1	36	45993 D	Spacer	1	.313
13	20296 D	Packing gland	1	37	2370 DAX	Pulley flange	1	1.500
14	21259 D	Fan	1	38	20289 D	Oil seal, front	1	.313
...	.....	Cap screw, 5/16" N.C. x 1-1/8"	1	39	21839 D	Gasket	1	.005
...	Q 1919	Lock washer, 5/16"	2	40	20301 D	Driving stud	2	.062
...	.....	Rivet, 3/16 x 1/2"	16	...	Q 1919	Lock washer, 5/16"	2	.003
15	3175 D	Cover	1	41	G 3792	Spring	2	.063
...	Q 1901	Hex. nut, 1/4" N.F.	6	42	20586 D	Pin	1	.125
...	Q 1918	Lock washer, 1/4"	6	...	Q 1903	Hex. nut, 5/16" N.F.	1	.015
16	24941 D	Gasket	1	...	Q 1919	Lock washer, 5/16"	1	.004
17	2557 DAX	Impeller, with shaft	1	43	20585 D	Driver	1	.250
21	20303 D	Thrust bushing	1	44	.....	Hex. jam nut, 5/16" N.C.	1	.015
22	45982 DX	Sleeve, with bushings	1	45	.....	Set screw, 5/16", N.C. x 7/8"	1	.012
23	24017 D	Bushing	1					

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

MAGNETO



B-358

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

MAGNETO - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	49094 D	Magneto (IHC) (H-4) . . .	1	10.156	24	55015 D	Condenser hole cover. .	1	.021
...	.....	Cap screw, 3/8" N.C. x 1-7/8" . . .	1		...	.....	Cadmium plated round head screw (No. 8 - 32 x 3/8")	2	.003
...	Q 1806	Cap screw, 3/8" N.C. x 1-1/2" . . .	1	.005	...	.....	Cadmium plated lock washer (No. 8) 3/64 x 3/64"	2	.001
...	Q 1920	Lock washer, 3/8" . . .	2		...	.....	Screw	1	.003
1	49125 D	Cable, with terminal. . .	1	.031	25	E4A-546	Cadmium plated lock washer (No. 4)	1	.000
2	37291 D	Terminal.	2	.001	...	.....	Cadmium plated lock washer (No. 4)	1	.003
3	38609 DA	Washer.	4	.009	26	47452 D	Secondary lead-out.	1	.250
4	49791 D	Screw	4	.531	...	.....	Coil core	1	.031
5	47449 DAY	Cover	1	.003	27	{ 21314 DX 57926 DX 47439 DAX	Coil with end insulators Coil with core and end insulators	1	.750
6	47453 D	Gasket.	1	.003	...	.....	Flat head slotted screw, No. 8 - 32 x 5/8"	2	.004
8	49424 D	Distributor body felt retainer	1	.406	28	49593 D	Insulator	2	.006
9	{ 47413 DX 47413 DY	Cap	1	.406	29	E4 - 226	Felt.	1	.003
10	{ 32032 DXA 21350 DXA	Cap with brush and spring	1	.003	30	47454 D	Retainer, inner	1	.031
11	.....	Brush and spring.	1	.003	31	E4A-352	Bearing outer race.	2	.057
...	.....	Cadmium plated round head screws, 8 - 32 x 1/2"	2	.004	32	E4A-353	Retainer with balls	2	.025
...	.....	Cadmium plated lock washer (No. 8) 3/64 x 3/64"	2	.001	33	E4A-351	Bearing inner race.	2	.031
12	{ 49417 D 49418 D	Felt retainer	1	.003	34	E4A-324	Oil flinger	1	.077
13	49416 DX	Felt.	1	.001	35	60094 D	Cam	1	1.375
14	49419 D	Cover with felt seal, retainer and gasket.	1	.093	36	49090 DXR	Rotor with bearings and keeper	1	.001
15	49420 DX	Gasket.	1	.002	37	47427 D	Nut	1	.000
16	E4 - 216	Spindle core and gear.	1	.108	...	.....	Cadmium plated lock washer (No. 6) 1/32 x 1/32"	1	.006
17	48472 D	Oil well felt	1	.003	38	47428 D	Arm	1	.093
18	51666 D	Condenser hole cover gasket	1	.006	39	{ 47425 DX 47425 DY	Distributor rotor	1	.093
19	55855 D	Spring.	2	.007	40	47417 DX	Distributor rotor with arm and nut	1	.015
20	47424 D	Pin	1	.002	41	49423 D	Pinion and plug	1	.001
21	47408 D	Pin	1	.003	42	21394 D	Felt seal	1	.003
22	21388 DEX	Gasket.	1	.015			Washer	1	
23	47431 DB	Point with support.	1	.015					
		Breaker arm	1						

SPARE PARTS CATALOG

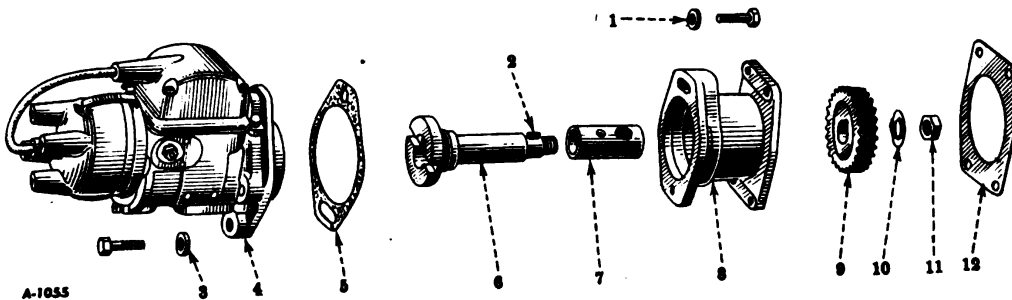
MAGNETO - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
43	47432 D	Spring anchor	1	.004	80	47464 D	Wick.	1	.006
...	.....	Cadmium plated flat head slotted screw (No. 8 - 32 x 3/8").	1	.003	81	47294 D	Felt retainer	1	.031
...	.....	Cadmium plated hex. nut (No. 8 - 32)	1	.006	83	49093 DX	Drive member and spring stop	1	.500
...	.....	Cadmium plated lock washer (No. 8) 3/64 x 3/64".	1	.006	84	44603 D	Washer.	1	.031
44	21409 DB	Condenser	1	.001	85	.....	Cadmium plated lock washer, 1/2"	1	.013
45	47438 DA	Washer, inner	1	.077	86	47470 D	Nut	1	.031
46	48341 D	Washer, outer	1	.006	88	47468 D	Stop pin.	1	.093
47	48342 DA	Lock washer	1	.001	89	46785 D	Lock washer (Shakeproof No. 1514).	4	.000
48	48340 DA	Terminal.	1	.006	90	4167 T	Key	1	.004
49	47409 D	Screw	3	.012	91	47461 D	Washer.	2	.002
...	.....	Cadmium plated lock washer (No. 10) 1/16" x 3/64".	3	.002	92	47462 D	Snap ring	2	.006
50	.....	Screw, No. 8 - 32 x 1-1/4"	1	.010	93	49092 D	Pawl.	2	.050
51	48339 D	Clip.	1	.006	95	49091 DX	Magneto member and pawl pin.	1	.187
...	.....	Cadmium plated lock washer (No. 8) 3/64 x 3/64".	1	.006	96	47822 D	Magneto member (includes 49091 DX and Ref. Nos. 91, 92 and 93)	1	.312
52	21393 D	Screw	1	.004	97	6483 DY	Spring.	1	.046
53	47433 DX	Primary lead-out and terminal.	1	.006	...	...	Distributor body (includes Ref. Nos. 16, 18 thru 21, 41, 98 and 101)	1	.250
54	6482 DAY	Frame (includes Ref. Nos. 17, 24, 29, 30 and 31).	1	1.750	...	...	Distributor body (includes 6483 DY and Ref. Nos. 11 thru 15, and 40)	1	8.000
56	E4A-305	Shim, light	As req.	.003	98	E4 -295	Oiler	1	.060
57	E4 -212	Shim, medium.	As req.	.002	99	E4 -294	Bearing	2	.078
58	E4A-372	Shim, heavy	As req.	.005	100	27311 D	Oiler	1	.006
59	47442 D	Primary to condenser lead-out tube.	1	.002	101	51667 D	Distributor cap spring pin.	1	.000
74	.....	Screw, 1/4" - 20 x 9/16"	4	.005	...	21342 D	Breaker cam key	1	.002
75	47474 D	Retainer, inner	1	.020	...	49091 DZ	Rotating unit (includes 49093 DX and Ref. Nos. 79 thru 83 and 91 thru 96)	1	.906
76	47475 DA	Oil seal.	1	.002	...	...	Magnet keeper	1	.375
77	47473 D	Retainer, outer	1	.005	...	57314 D	...	...	...
78	6783 DX	Mounting flange (includes Ref. Nos. 31, 75, 76, 77, 88 and 100)	1	.438	...	...	...	...	...
79	47465 D	Button.	2	.009	...	...	...	...	...

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

MAGNETO DRIVE



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

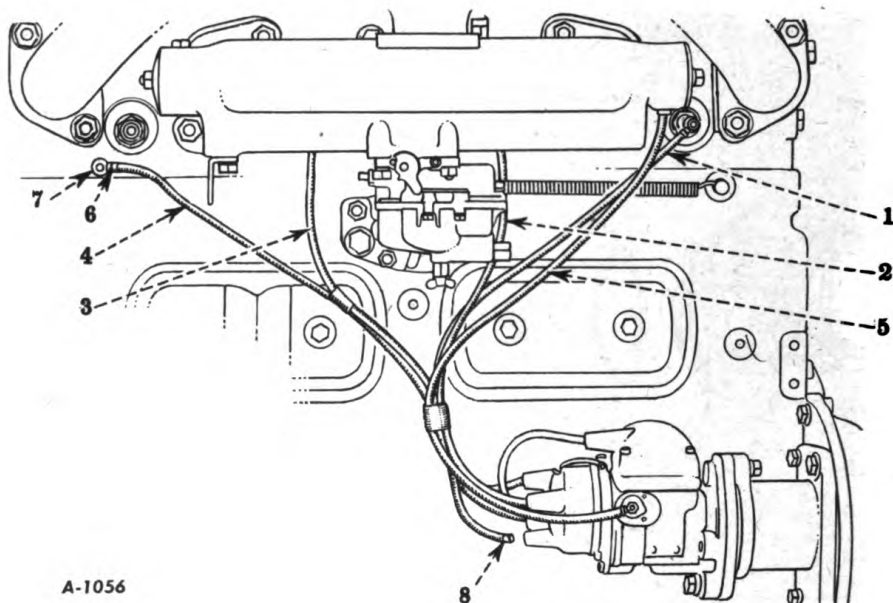
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	62493 D	Bolt washer	1	.015
2	4167 T	Key	1	.012
3	62493 D	Bolt washer	1	.016
4	49094 D	Magneto	1	8.046
...	.....	Cap screw, 3/8 - 16 x 1-7/8" N.C.	1	.063
...	Q 1806	Cap screw, 3/8 - 16 x 1-1/2" N.C.	1	.063
...	Q 1920	Lock washer, 3/8"	2	.005
5	55780 DA	Flange gasket	1	.003
6	45001 D	Magneto drive shaft	1	1.440
7	24473 D	Bushing	1	.156
8	8394 DX	Bracket, with bushings.	1	6.000
...	.....	Cap screw, 3/8" N.C. x 1-3/8"	4	.047
...	Q 1920	Lock washer, 3/8"	4	.000
9	53264 D	Gear (27 teeth)	1	.875
10	45003 D	Nut lock	1	.062
11	.....	Hex. jam nut, 5/8" N.F.	1	.063
12	50360 D	Gasket	1	.008

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

SPARK PLUG CABLES



A-1056

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

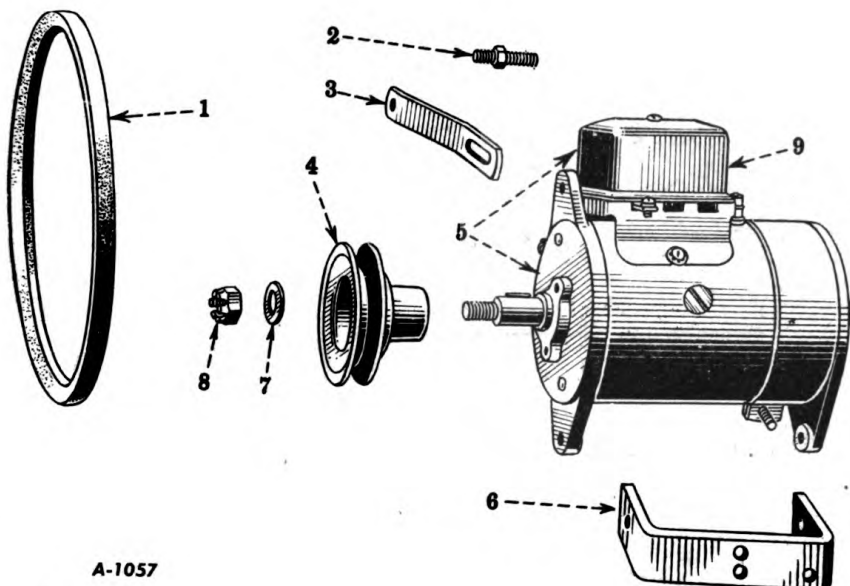
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	53263 DA	Spark plug cable assembly	1	.375
1	49359 D	Cable No. 1	1	.063
2	29873 D	Cable No. 2	1	
3	29340 D	Cable No. 3	1	
4	29874 D	Cable No. 4	1	.130
5	53262 D	Short circuiting cable.	1	.125
...	.....	Cadmium plated fillister head screw, No. 10 - 32 x 5/16".	1	.005
...	.....	Cadmium plated fillister head screw, No. 10 - 32 x 3/8".	1	.004
...	.....	Cadmium plated lock washer, No. 10.	2	.002
6	27618 D	Cable reinforcement	4	.001
7	1924 T	Cable terminal (ring type).	6	.002
8	37291 D	Cable terminal (push type).	4	.001

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

GENERATOR, PULLEY AND BRACKETS



A-1057

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

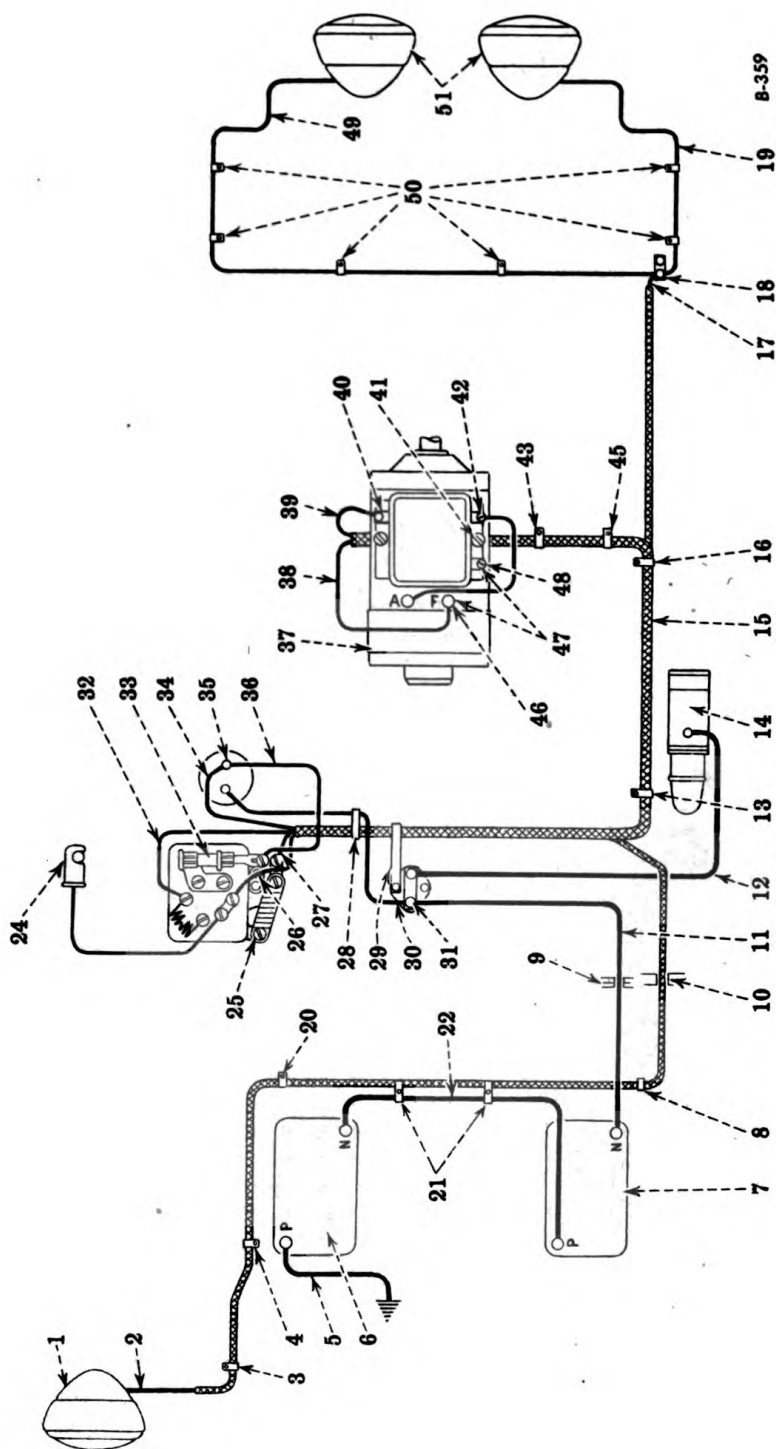
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	54857 DA	Belt.	1	.188
2	50893 D	Water pump stud (for generator brace)	1	.250
...	Q 1905	Hex. nut, 3/8" N.F.	1	.006
...	Q 1920	Lock washer, 3/8"	1	.005
3	50892 DA	Generator brace	1	.250
...	Q 4014	Cap screw, 5/16" N.C. x 5/8"	1	.026
...	Q 1919	Lock washer, 5/16"	1	.004
...	Q 397	Washer, 11/32" I.D. x 3/4" O.D. No. 16 gage	1	.006
4	8081 D	Pulley.	1	1.000
5	50895 D	Generator with relay (12 volt) (Delco-Remy No. 1101725)	1	18.625
...	.....	Cotter, 3/32 x 1"	1	.001
6	50891 D	Generator bracket	1	2.125
...	.....	Cap screw, 5/16" N.C. x 1-1/8" . . .	2	.034
...	Q 1830	Cap screw, 7/16" N.C. x 1"	3	.065
...	Q 1904	Hex. nut, 5/16" N.C.	2	.016
...	Q 1919	Lock washer, 5/16"	2	.004
...	Q 1921	Lock washer, 7/16"	3	.010
...	Q 1922	Washer, 1/2"	1	.013
7	.....	Castle hex. nut, 1/2" N.F.	1	.016
8	42998 D	Generator relay (Delco-Remy No. 1116777)	1	.938

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

ELECTRIC STARTING AND LIGHTING UNIT WIRING DIAGRAM



Ref. No.	I H C Part No.	Description	Ref. No.	I H C Part No.	Description
1	43035 D	Tail lamp.	26	.....	Cable - switch to rear lamp.
2	.....	Switch cable - switch to tail lamp.	27	.....	Black with white tracer.
3	62302 D	clip - on fender mounting carriage bolt in bracket.	28	28428 D	Cable - generator field to switch
					clip - natural with black tracer.

SPARE PARTS CATALOG

ELECTRIC STARTING AND LIGHTING UNIT

WIRING DIAGRAM - Continued

4	60938 D	Clip - on fender mounting bolt.	29	63763 D	Clip - on starting switch mounting bolt.
5	42833 D	Cable - battery to ground. Ground cable on fuel tank mounting bolt - second from rear.	30	57055 DX	Cable - starting switch to ammeter.
6	60912 DNS	Battery.	31	64931 H	Starting switch.
7	55467 D	Battery.	32	.....	Cable - switch to junction block, black.
8	60912 DNS	Battery.	33	10815 V	Fuse.
9	55467 D	Battery.	34	.....	Cable - generator to ammeter - natural with black and red cross tracers.
10	61813 D	Clip - on seat support front.	35	42383 D	Ammeter.
11	50203 H	Battery cable grommet (in dash).	36	.....	Cable - ammeter to switch.
12	6838 HA	Grommet - in dash.	37	50895 D	Generator.
13	57056 D	Cable - battery to starting switch.	38	.....	Cable - generator to field switch - natural with black tracer.
14	50899 D	Cable - starting switch to starting motor.	39	.....	Cable - generator to ammeter - natural with black and red cross tracer.
15	60938 D	Clip - on side angle - (use 3/8 N.C. x 1" cap screw, nut and lock washer).	40	.....	"BAT" terminal on relay.
16	37753 D	Starting motor.	41	.....	Relay mounting screw.
17	50894 D	Cable harness, cpt.	42	.....	"GEN" terminal on relay.
18	60938 D	Clip - on side angle - (use 3/8 N.C. x 1" hex. hd. cap screw, nut and lock washer).	43	62302 D	Clip - on generator mounting bracket front bolt.
19	.....	Cable - switch to junction block - black.	45	60938 D	Clip - on magneto bracket bolt.
20	42917 D	Junction block.	46	.....	"F" terminal on generator frame.
21	31522 DX	Cable - right head lamp to junction block.	47	.....	Remove short lead connecting "F" terminal on frame to "F" terminal on relay. Connect generator field to switch cable directly to "F" terminal on generator frame.
22	61813 D	Clip - on seat support front.	48	.....	"F" terminal on relay.
23	56278 D	Clip - on seat support front.	49	32046 DX	Cable - left head lamp to junction block.
24	50897 D	Cable - battery to battery.	50	60938 D	Clip - on fan shroud bolts.
25	65534 D	Dash lamp.	51	43035 D	Head lamp mounted on top of radiator.
	57311 DX	Lighting switch. A good electrical connection must be established between switch and switch mounting to complete generator field circuit.			

SPARE PARTS CATALOG

ELECTRICAL EQUIPMENT

I H C Part No.	Description	No. Used	Wt. Lbs.
28428 D	Cable clamp.	1	.031
*37753 D	Starting motor (Delco-Remy No. 710) 12 volt.	1	45.000
Q 4075	Cap screw, 9/16" N.F. x 1-1/8"	3	
Q 1924	Lock washer, 9/16"	3	.641
42383 D	Ammeter.(AC Model AM-1801)	1	.250
42915 D	Head lamp junction block	1	.013
.....	Round head machine screw, #10-24 x 1/2"	1	.005
.....	Hex. nut, #10-24 (Type F)	1	.006
Q 1916	Lock washer, #10	1	.002
42916 D	Head lamp junction block bracket	1	.016
42917 D	Head lamp junction block and bracket assembly	3	.063
42921 D	Head lamp bracket.	2	.750
Q 1848	Cap screw, 1/2" N.C. x 1"	4	.070
Q 1922	Lock washer, 1/2"	4	.013
42921 D	Rear lamp bracket.	1	
Q 1847	Capscrew, 1/2 N.F. x 1"	2	.100
Q 1909	Hex. nut, 1/2" N.F.	2	.035
Q 1922	Lockwasher, 1/2"	2	.013
43035 D	Head lamp, left hand and right hand and rear lamp (see details on page 10)	3	7.186
*50895 D	Generator (12 volt) Delco-Remy 1,101,725 (for belt, brackets, relay, etc., see page 5)	1	18.625
54044 D	Starting motor shield.	1	3.250
Q 1802	Cap screw, 3/8" N.C. x 1"	2	.045
Q 4016	Hex. nut, 3/8" N.C. (Type D)	2	.010
Q 1920	Lock washer, 3/8"	2	.005
54064 D	Battery cable shield	1	.047
Q 4016	Cap screw, 3/8" N.C. x 5/8"	3	.039
Q 1906	Hex. nut, 3/8" N.C.	3	.020
Q 1920	Lock washer, 3/8"	3	.005
55752 D	Choke control rod and button assembly.	1	.250
.....	Cotter, 1/16 x 3/8"	1	.001
56278 D	Battery cable clip	2	
Q 1800	Cap screw, 3/8" N.C. x 3/4"	2	.035
Q 1906	Hex. nut, 3/8" N.C.	2	.020
Q 1920	Lock washer, 3/8"	2	.005
57311 DX	Lighting switch, complete (see details on page 11).	1	.625
.....	Lock washer, #8	1	.002
60938 D	Loom clip, 1/4" for 3/8" bolt.	10	.016
Q 1802	Cap screw, 3/8" N.C. x 1"	2	.045
Q 1906	Hex. nut, 3/8" N.C.	2	.020
Q 1920	Lock washer, 3/8"	2	.005
61813 D	Tail lamp cable clip	3	.031
62302 D	Loom clip (1/4" for 1/2" bolt)	2	.041
63763 D	Cable harness clip	1	.031
65534 D	Dash lamp.	1	.125
6838 HA	Rear lamp grommet.	1	
29939 H	Dash lamp bulb	1	
50203 H	Battery cable grommet.	1	
64931 H	Starting switch (Delco-Remy No. 405-C)	1	.500
Q 1753	Cap screw, 1/4" N.F. x 1/2"	2	.008
Q 1901	Hex. nut, 1/4" N.F.	2	.010
Q 1918	Lock washer, 1/4"	2	.001
10915 V	Lighting switch fuse	1	.002

* All service and replacement parts should be referred to an Authorized United Motors Service Station or Branch.

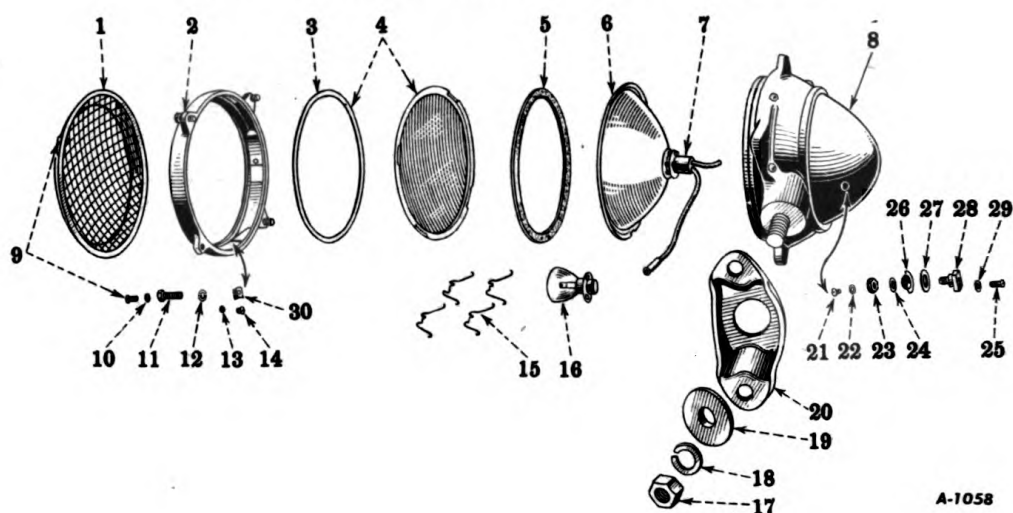
ELECTRICAL CABLES

I H C Part No.	Description	No. Used	Wt. Lbs.
31522 DX	Right head lamp cable (includes (2) terminals #38433 D, loom #23433 D, and (2) clamp rings #27618 D)	1	
32046 DX	Left head lamp cable (includes (2) terminals #38433 D, loom #30701 D, and (2) clamp rings #27618 D)	1	.234
42833 D	Battery to ground cable (includes positive terminal with bolt #38778 D)	1	1.000
50894 D	Lighting cable harness (includes (7) terminals #38433 D, terminal #27637 H, and (8) insulators #28499 H)	1	1.500
50897 D	Battery to battery cable (includes negative terminal with bolt #26376 H, positive terminal with bolt #26375 H, insulator #41910 D and insulator #41913 D)	1	1.906
50899 D	Starting switch to starting motor cable (includes terminal #46074 H, terminal #23431 D, casing #66299 D, and (2) insulator #41911 D)	1	1.671
57055 DX	Starting switch to ammeter cable (includes terminal #38433 D, terminal #38937 D, loom #27378 D, and (2) clamp rings #27618 D)	1	.063
57056 D	Battery to starting switch cable (includes negative terminal with bolt #26376 H, terminal #46074 H, casing #57057 D and (2) insulators #41912 D)	1	2.906
61645 D	Ammeter to lighting switch cable (includes (2) terminals #38433 D, and (2) insulators #28500 H)	1	.050

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

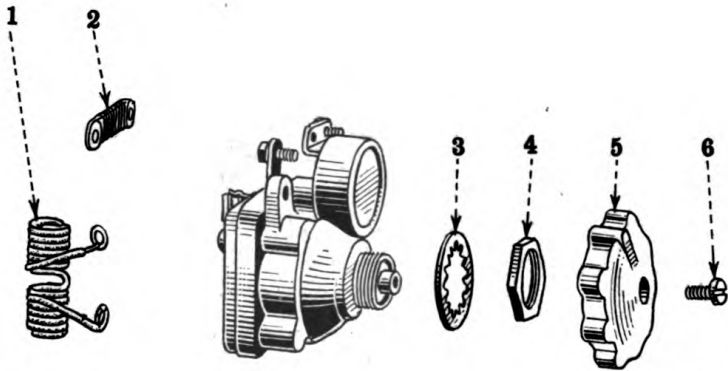
HEAD AND REAR LAMPS (43035 D)



Ref. No.	I H C Part No.	Guide Lamp Co. No.	Description	No. Used Per Lamp	Wt. Lbs.
...	51888 D	923754	Door and guard assembly with lens.	1	
...	51895 D	924021	Terminal plate assembly. . .	1	
1	51891 D	923756	Guard assembly	1	.500
2	51889 D	923775	Door only.	1	1.265
3	51970 D	921636	Gasket	1	.016
4	50784 D	921634	Lens with gasket	1	.750
5	51892 D	921638	Door gasket.	1	1.688
6	51894 D	924079	Reflector.	1	.375
7	51893 D	924023	Socket assembly with wire. .	1	.063
8	51887 D	921627	Body assembly	1	3.250
9	Q 1915	121839	Screw, No. 6 - 32 x 3/8" . .	4	.004
10	41229 H	.....	Lock washer, No. 6 (Shakeproof No. 1206)	4	
11	Q 4001	121893	Cap screw, 1/4" N.C. x 7/8".	4	.160
12	Q 1918	.....	Lock washer, 1/4"	4	.002
13	Q 1915	106495	Lock washer, No. 6	1	.000
14	.....	132684	Screw, No. 6 - 32 x 3/16". .	1	.001
15	50539 H	914255	Spring	4	
16	66340 H	.....	Bulb - 12 volt (Mazda No. 2326)	1	
17	.....	103030	Hex. jam nut, 5/8" N.F. . . .	1	.063
18	Q 1925	.....	Lock washer, 5/8"	1	.031
19	36273 D	234869	Washer	1	.002
20	42921 D	.....	Bracket.	1	.750
...	Q 1848	.....	Cap screw, 1/2" N.C. x 1". .	4	.070
...	Q 1922	.....	Lock washer, 1/2".	4	.013
21	.....	115598	Screw, No. 8 - 32 x 1/4" . .	1	.005
22	48716 H	138530	Lock washer, (Shakeproof No. 1208)	1	.000
23	37063 D	134566	Nut.	1	.010
24	Q 1919	112723	Lock washer,	1	.004
25	.....	115548	Screw, No. 8 - 32 x 1/4" . .	1	.004
26	37072 D	918652	Cup.	1	.000
27	37075 D	918653	Insulating washer.	1	.001
28	37064 D	918651	Terminal plate	1	.008
29	48716 H	138530	Lock washer, (Shakeproof No. 1208)	1	.001
...	51898 D	924753	Clip.	1	.004

SPARE PARTS CATALOG

DETAIL PARTS OF LIGHT SWITCH (57311 DX)



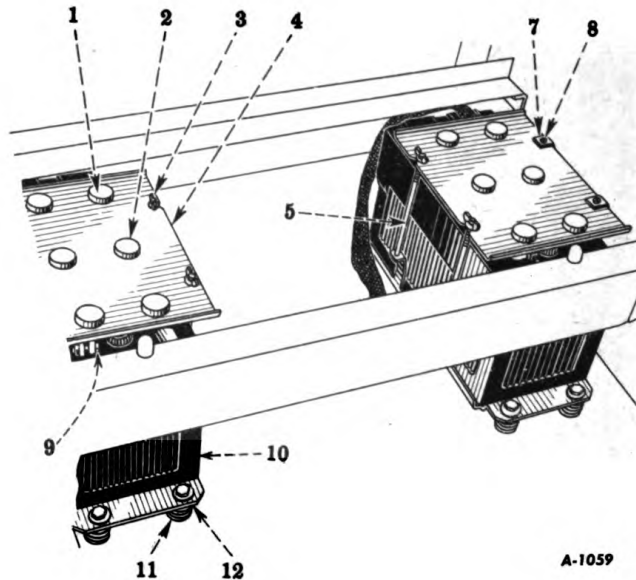
A-120

Ref. No.	I H C Part No.	Delco-Remy No.	Description	No. Used	Wt. Lbs.
...	57311 DX	1994020	Lighting switch (12 volt) . .	1	.125
1	43039 D	1877830	Dimmer resistance coil	1	.016
2	43040 D	1877831	Generator field resistance coil	1	.016
3	49425 H	.....	Switch lock washer (Shake-proof No. 1230).	1	.006
4	57312 D	1882012	Switch mounting nut	1	.000
5	57313 D	1882013	Switch knob	1	.083
6	64022 H	1864099	Knob mounting screw	1	.004

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

BATTERIES AND CONNECTIONS



A-1059

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50234 D	Battery hold-down rubber, short.	4	.047
2	50235 D	Battery hold-down rubber, long	8	.063
3	Q 3505	Wing nut, 5/16" N.C.	4	.184
4	41832 DBX	Cover, with hold-down rubbers.	2	4.500
5	52435 D	Clamp bolt	4	.219
7	41831 D	Stud washer	4	.031
8	41830 D	Clamp stud	4	.313
...	Q 1904	Hex. nut, 5/16" N.C.	16	.016
9	57056 D	Battery to starting switch cable	1	2.906
10	55467 D	Battery (Willard 5244 Type DRG-15-3) (optional with 60912 DNS)	2	70.000
	60912 DNS	Battery (Auto-Lite No. H-15) (optional)	2	70.000
11	37976 D	Bottom rest spring	8	.125
12	47868 DX	Bottom support	2	5.500
...	Q 1857	Cap screw, 1/2" N.C. x 2-1/4"	8	.167
...	.....	Washer, 17/32" I.D. x 1-1/4" O.D. (14 ga.)	8	.008
...	41827 D	Battery bottom mounting spacer	8	.125

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

ENGINE

	Page
Air Cleaner and Connections.	16, 17
Camshaft	3
Crankcase.	6 to 8
Crankcase Guard.	5
Crankcase Oil Pan.	7
Crankshaft	10 to 12
Cylinder Head.	2 to 4
Cylinder Sleeves	10, 11
Exhaust Muffler.	14
Flywheel	10, 11
Front Pull Hook.	5
Fuel Oil Filter.	19
Lubricating Oil Filter	18
Lubricating Oil Pump	13
Manifolds, Intake and Exhaust.	14, 15
Pistons.	10, 11
Spark Plugs.	2
Starting Crank	9
Valves	2, 3

COMPLETE ENGINE REPLACEMENT

67936 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 1.
 68274 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 2.
 67937 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 3.
 67938 D ENGINE COMPLETE; also includes ACCESSORIES shown in COLUMN 4.

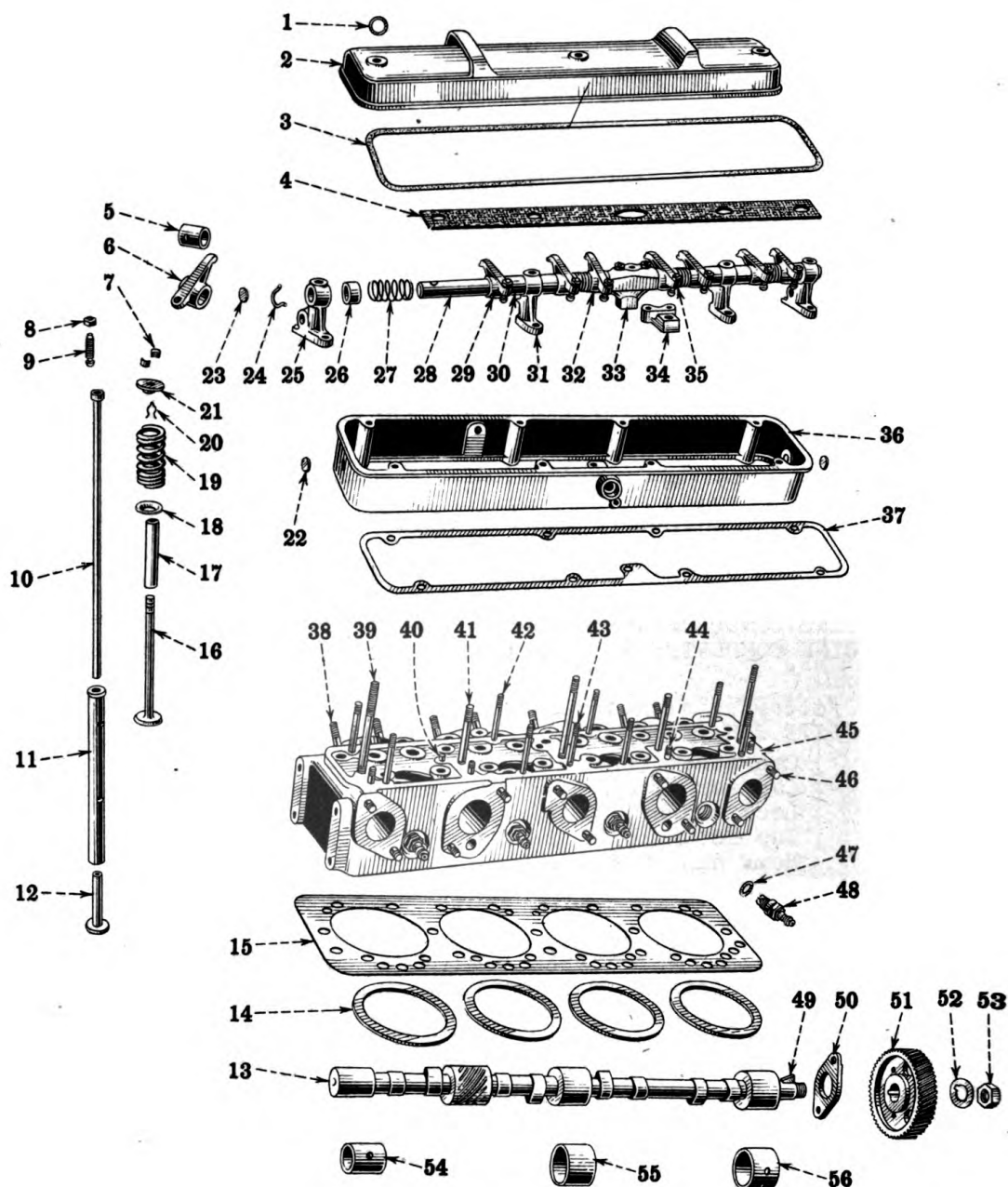
NOTE: The following standard parts are used to attach the above COMPLETE ENGINES.

Cap screw, 5/8" N.C. x 1-1/2".	6
Cap screw, 5/8" N.C. x 2-3/8".	2
Lock washer, 5/8".	8
Cap screw, 5/8" N.F. x 3-3/4".	2
Hex. nut, 5/8" N.F.	2
Lock washer, 5/8".	2

ACCESSORIES	1	2	3	4
Cylinder head, complete with injection nozzles and spark plugs.	x	x	x	x
Diesel starting mechanism	x	x	x	x
Oil level gauge	x	x	x	x
Manifolds	x	x	x	x
Fan drive pulley.	x	x	x	x
Flywheel.	x	x	x	x
Water outlet elbow and thermostat	x	x	x	x
Rear engine support with studs, dowels and mounting bolts	x	x	x	x
Front engine support with shims and mounting bolts. . .	x	x	x	x
Carburetor.	x	x	x	-
Magneto and wiring.	x	x	x	-
Diesel fuel injection pump and filter system.	x	x	x	-
Lubricating oil filter.	x	x	x	-
Water pump with fan and fan belt.	x	x	x	-
Starting motor.	x	x	-	-
Generator with belt	x	x	-	-
Engine clutch	x	-	-	-

SPARE PARTS CATALOG

CYLINDER HEAD, VALVES, ETC.



B-360

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

CYLINDER HEAD, VALVES, ETC. - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	58458 D	Washer.	3	.002
2	50665 DX	Cover	1	6.000
...	Q 1901	Hex. nut, 1/2" N.F.	3	.010
3	32685 D	Gasket.	1	.063
4	27129 DD	Oiler felt.	1	.040
5	24965 DB	Lever bushing	8	.063
6	32468 DX	Lever with bushing, right hand.	2	.500
7	32485 D	Key	16	.016
8	38763 H	Nut	8	.006
9	10951 D	Adjusting screw	8	.046
10	32486 DAX	Push rod.	8	.438
11	4988 D	Tappet guide.	8	1.750
12	25043 DB	Tappet.	8	.500
13	53380 D	Camshaft.	1	19.000
14	{ 67227 D	Set of four cylinder head gasket rings.	1	
	{ 25090-DD	Gasket ring	4	.250
15	50675 DA	Gasket.	1	.063
16	{ 32482 DB	Exhaust valve	4	.500
	{ 42747 D	Intake valve.	4	.625
17	5025 DBR	Guide	8	.375
18	18746 DA	Lower seat.	8	.015
19	61808 D	Spring.	8	.375
20	18539 D	Retainer.	8	.001
21	42748 D	Upper seat.	8	.125
22	13083 D	Plug.	2	.012
23	13083 D	Plug.	2	.012
24	27141 D	Retainer ring	2	.005
25	5027 DB	End bracket	2	1.000
...	Q 1901	Hex. nut, 1/2" N.F.	2	.010
...	Q 1905	Hex. nut, 3/8" N.F.	2	.015
...	Q 1920	Lock washer, 3/8"	2	.005
26	24962 D	Spacer, outer	2	.093
27	24961 D	Spring.	4	.031
28	27140 DDX	Shaft, complete with retainer ring and plug	2	1.688
29	32466 DX	Lever, straight, with bushing	4	.500
30	24964 D	Spacer, intermediate.	4	.156
31	5028 D	Intermediate bracket.	2	.750
...	Q 1901	Hex. nut, 1/2" N.F.	2	.010
...	Q 1905	Hex. nut, 3/8" N.F.	2	.015
...	Q 1920	Lock washer, 3/8"	2	.005
32	32467 DX	Lever with bushing, left hand	2	.500
33	8063 D	Center bracket, upper half.	1	1.500
...	Q 1901	Hex. nut, 1/2" N.F.	1	.010
...	Q 1810	Cap screw, 3/8" N.C. x 2"	2	.077
...	Q 1920	Lock washer, 3/8"	2	.005
...	Headless set screw cup point, 5/16" N.C. x 3/4".	2	.016
...	Hex. jam nut, 5/16" N.C.	2	.008

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When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

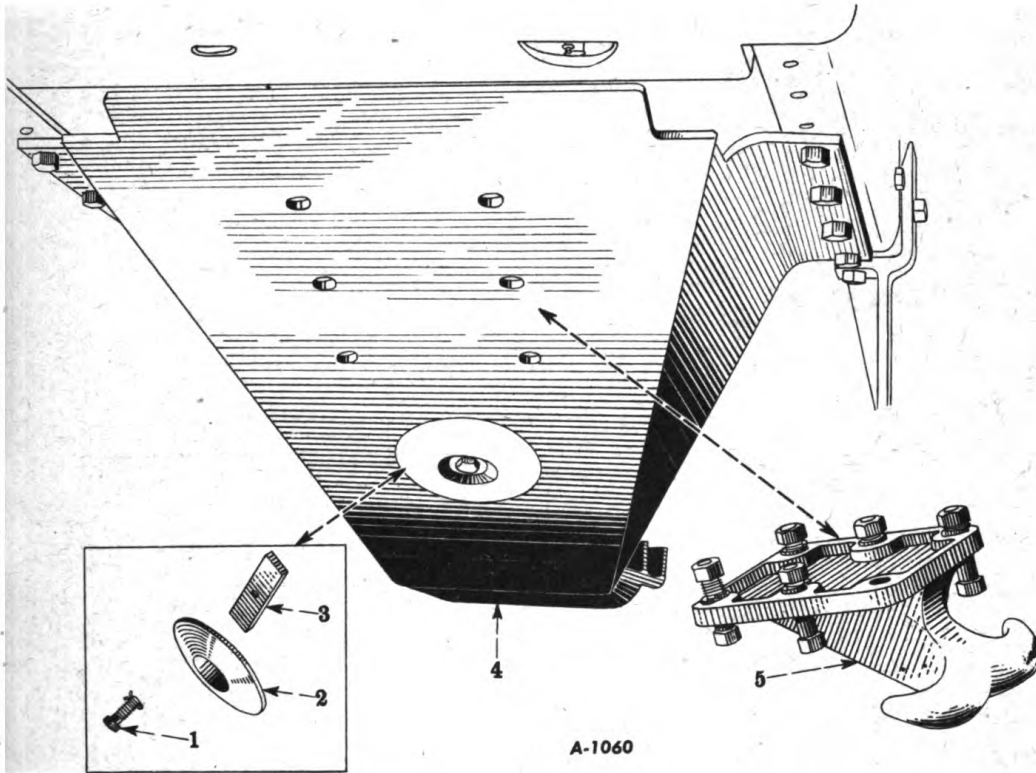
CYLINDER HEAD, VALVES, ETC. - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
34	8062 D	Center bracket, lower half.	1	.625
35	32468 DX	Lever with bushing, right hand.	2	.500
36	8061 DX	Housing	1	15.250
...	Q 1905	Hex. nut, 3/8" N.F.	8	.010
...	Q 1903	Hex. nut, 5/16" N.F.	1	.010
37	50669 D	Gasket	1	.063
38	54158 D	Nozzle body stud.	8	.250
39	32447 DA	Bracket stud, long	3	.250
40	50668 D	Locating pin.	1	.063
41	32448 D	Intermediate bracket stud	2	.188
42	32444 D	Valve housing stud, long.	8	.313
43	50664 D	Valve housing stud, short	1	.063
44	32445 D	Bracket stud, short	4	.188
45	8064 DAXA	Head, includes valve inserts, valve guides, studs and stud sleeves . . .	1	83.000
	8064 DAYA	Head, includes 8064 DAXA with valves, valve springs, seats, keys and re-tainer	1	90.000
...	.....	Countersunk pipe plug, 3/8"	4	.063
...	.....	Countersunk pipe plug, 1/2"	2	.031
46	50677 D	Manifold stud	10	.063
47	3405 H	Spark plug gasket	4	.003
48	31536 DB	Spark plug (Champion No. 44).	4	.250
49	13055 D	Key (Woodruff "B", 3/16 x 1")	1	.063
50	5960 D	Thrust plate.	1	.500
...	Q 1850	Cap screw, 1/2" N.C. x 1-1/4"	2	.110
...	Q 1922	Lock washer, 1/2"	2	.012
51	32284 DA	Gear.	1	5.250
52	25323 D	Nut lock.	1	.063
53	58253 D	Nut	1	.188
54	25083 DCR	Rear bearing.	1	.250
55	32282 DCR	Center bearing.	1	.313
56	50283 DAR	Front bearing	1	.250
...	32454 D	Cylinder head stud nut.	21	.125
...	50410 DA	Oil header plug	1	.250

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

CRANKCASE GUARD AND FRONT PULL HOOK



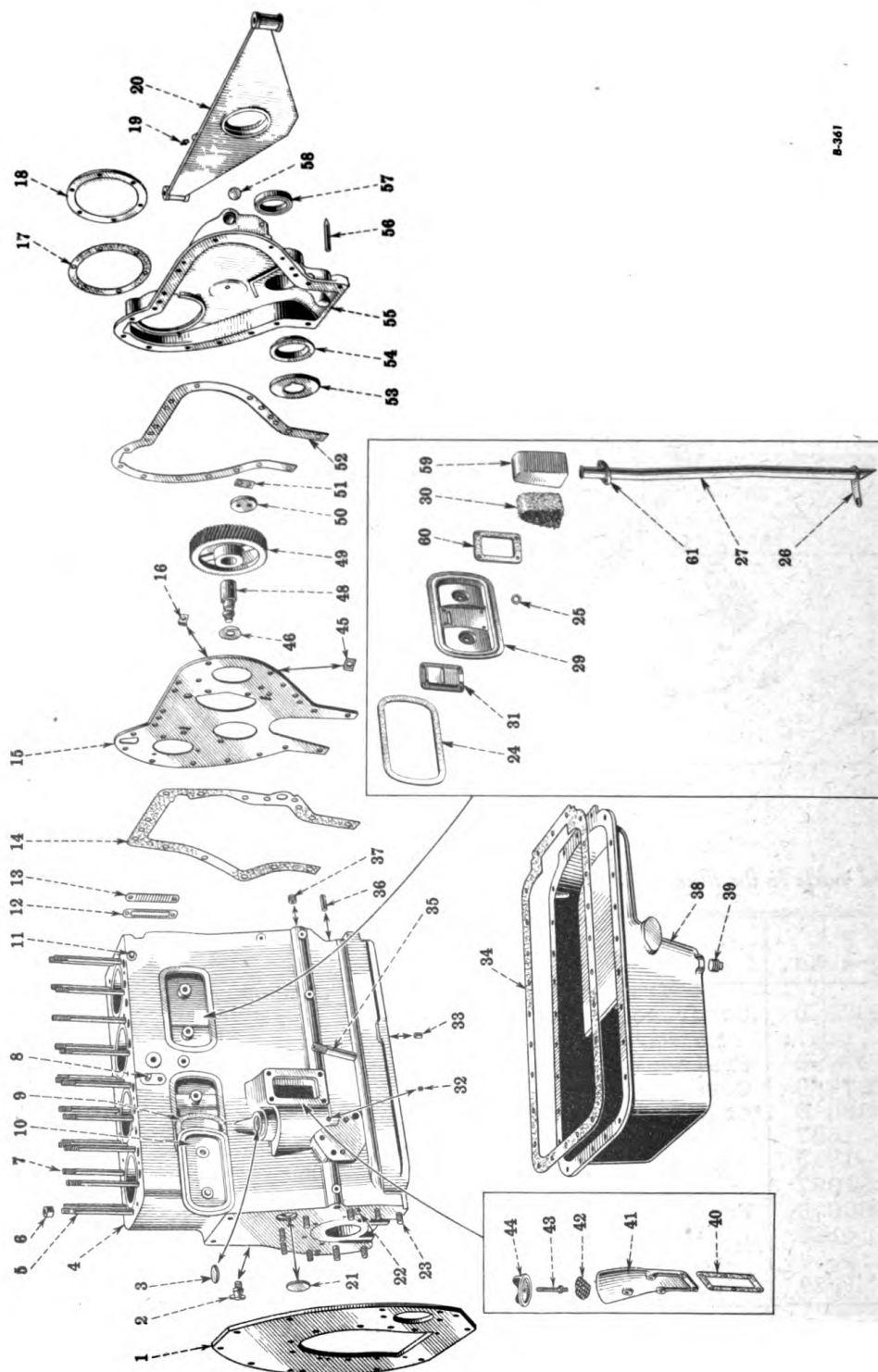
Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	42879 D	Cover bolt	1	.125
...	.....	Cotter, 1/8 x 3/4"	1	.004
2	5977 D	Drain plug cover	1	2.000
3	42877 D	Cover support	1	1.125
4	50880 D	Crankcase guard complete	1	132.000
...	Q 1887	Cap screw, 3/4" N.F. x 1-3/4"	8	.375
...	Q 1913	Hex. nut, 3/4" N.F.	8	.083
...	Q 1927	Lock washer, 3/4"	8	.045
5	5980 D	Front pull hook.	1	41.500
...	Q 4166	Cap screw, 7/8" N.F. x 2-3/4"	6	.625
...	.....	Hex. nut, 7/8" N.F.	6	.156
...	Q 1929	Lock washer, 7/8"	6	.050

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

CRANKCASE



8-361

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

CRANKCASE - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50363 DAR	Rear engine support.	1	36.000		Q 3615	Lubricator (Lincoln No. 5000) (optional).	1	.016
...	Q 1911	Hex. nut, 5/8" N.F.	9	.063	19	14186 DA	Lubricator (Alemite No. 1610) (optional).	1	.015
...	Q 1925	Lock washer, 5/8"	9	.024		50362 DX	Engine support, front, with lubricator.	2	24.000
2	31729 D	Drain cock.	1	.077	20		Pipe nipple, 1/8 x 3"	1	.125
3	29565 D	Plug.	1	.063			Pipe coupling, 1/8"	1	.016
4	8463 DDX	Crankcase.	1	525.000			Plug.	1	.088
...	39810 D	Pipe plug, 1/8"	1	.016			Dowel.	2	.063
5	32454 D	Stud, long.	13	.625		13439 V	Stud.	9	.250
6	42717 D	Nut.	21	.125	21	25086 DA	Gasket.	1	.002
7	53643 D	Stud, short.	8	.500	22	39757 D	Washer.	4	.063
8	...	Latch bracket stud.	1	.125	23	49026 D	Clip.	1	.041
...	Q 1905	Hex. nut, 3/8" N.F.	1	.006	24	59483 D	Breather pipe.	1	.375
...	Q 1920	Lock washer, 3/8"	1	.005	25	Q 4013	Cap screw, 5/16" N.C.	2	.026
...	Q 1920	Gasket.	1	.002	26		x 7/8"	2	.004
10	39756 D	Side plate, rear.	1	.875	27	Q 1919	Lock washer, 5/16"	2	.063
...	Q 4017	Cap screw, 3/8" N.C.	1	.047	29	59485 D	Side plate.	1	
11	50826 D	x 7/8"	2	.063			Cap screw, 3/8" N.C.	2	.047
12	39762 D	Spring pin.	1	.006			x 7/8"	2	.156
13	39761 D	Front plate gasket.	1	.281			Element.	1	.094
...	Q 4017	Cap screw, 3/8" N.C.	1	.047	30	59482 D	Baffle.	1	.250
...	Q 1920	Lock washer, 3/8"	2	.005	31	50410 DA	Plug.	5	.001
14	50478 D	Gasket.	2	.006	32	52606 D	Plug (wood).	2	.063
15	50487 DX	Front plate, with lock	1	.563	33	25082 DD	Gasket.	1	.500
...	Q 1800	Cap screw, 3/8" N.C.	2	.035	34	50357 D	Sleeve.	1	.063
...	Q 1848	x 3/4"	2	.090	35	52605 D	Dowel.	2	.063
...	Q 1848	Cap screw, 1/2" N.C.	3	.090	36	30397 D	Pipe plug.	2	60.000
16	50408 D	Bolt lock.	3	.250	37	63986 D	Oil pan, with plugs.	1	.050
17	50829 D	Gasket.	2	.006	38	Q 1804	Cap screw, 3/8" N.C.	23	.006
18	8414 D	Fuel pump gear cover.	1	2.750			x 1-1/4"	3	.005
...	Q 4013	Cap screw, 5/16"	1	.026		Q 1905	Hex. nut, 3/8" N.F.	26	.005
...	Q 1919	N.C. x 7/8"	6	.004		Q 1920	Lock washer, 3/8"	1	.077
...	Q 1919	Lock washer, 5/16"	6	.004	39	58997 D	Pipe plug, 3/4"	1	.013
...	Q 1919	Lock washer, 5/16"	6	.004	40	42733 D	Gasket.	1	.013

(Continued on next page)

SPARE PARTS CATALOG

CRANKCASE - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
41	8029 D	Oil filler body . . .	1	3.500	56	48138 D	Timing pointer . . .	1	.125
...	Q 1816	Cap screw, 3/8" N.C. x 2-3/4" . . .	1	.105	57	53872 D	Oil seal . . .	1	.310
...	Q 1802	Cap screw, 3/8" N.C. x 1" . . .	3	.045	58	13806 D	Welch plug, 1-1/4" . . .	1	.031
...	Q 1920	Lock washer, 3/8" . . .	4	.005	59	8959 D	Breather body . . .	1	.688
42	50411 D	Screen . . .	1	.125	...	.....	Round head machine screw, No. 10 - 24 N.C. x 1/2" . . .	4	.005
43	28797 D	Stud . . .	1	.063	...	Q 1916	Lock washer, No. 10 . . .	4	.002
44	Q 1906	Hex. nut, 3/8" N.C. . . .	1	.020	60	59481 D	Breather body gasket . . .	1	.006
45	4819 D	Cap . . .	1	.031	61	59484 D	Breather pipe flange . . .	1	.093
46	32370 D	Bolt lock . . .	3	.063	...	13897 D	Distributor hole lock washer . . .	1	.001
48	25132 D	Nut lock . . .	1	1.188	...	Q 4012	Cap screw, 5/16" N.C. x 5/8" . . .	1	.026
...	25138 DAX	Idler gear shaft . . .	1	.063	...	45976 D	Front engine support shim, heavy . . .	2	.031
...	.....	Hex. jam nut, 3/4" N.F. . . .	1	.063	...	45977 D	Front engine support shim, light . . .	As req.	.010
49	25140 DBX	Idler gear with bushing . . .	1	1.438	...	46250 D	Front plate cap screw lock . . .	1	.004
50	25131 D	Thrust washer . . .	1	.250	...	.....	Rivet, 3/16 x 3/8" . . .	1	.005
...	Q 1773	Cap screw, 5/16" N.F. x 3/4" . . .	2	.031	...	62863 D	Rear engine support dowel bolt . . .	2	.250
51	25130 D	Bolt lock . . .	1	.063	...	Q 1911	Hex. nut, 5/8" N.F. . . .	2	.063
52	50486 D	Gasket . . .	1	.006	...	Q 1925	Lock washer, 5/8" . . .	2	.021
53	36796 DA	Oil flinger . . .	1	.063	...	...	...	...	...
54	46129 D	Oil deflector . . .	1	.090	...	...	...	...	...
55	8413 DX	Front cover, with oil deflector, timing pointer and oil seal . . .	1	30.000	...	...	...	...	...
...	Q 1852	Cap screw, 1/2" N.C. x 1-1/2" . . .	7	.111	...	...	...	...	...
...	Q 1802	Cap screw, 3/8" N.C. x 1" . . .	5	.045	...	...	...	...	...
...	Q 1856	Cap screw, 1/2" N.C. x 2" . . .	2	.035	...	...	...	...	...
...	Q 1922	Lock washer, 1/2" . . .	9	.012	...	...	...	...	...
...	Q 1920	Lock washer, 3/8" . . .	5	.005	...	...	...	...	...

When ordering, always use I H C Part Nos.

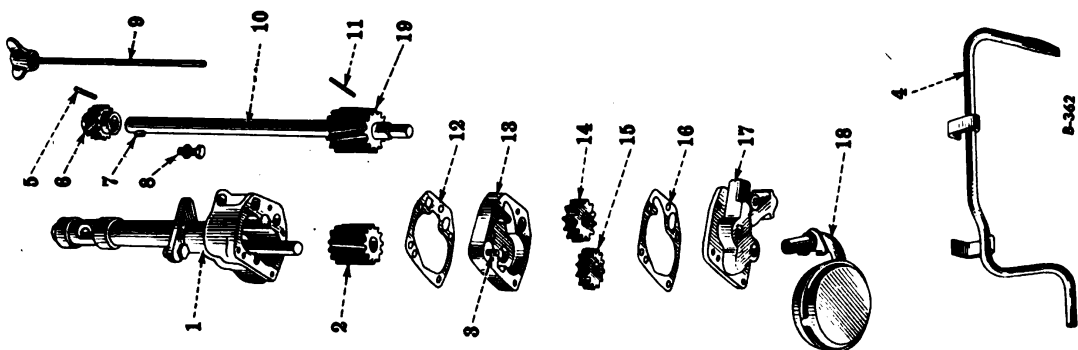
SPARE PARTS CATALOG

Engine - 4
Page 9

LUBRICATING OIL PUMP AND OIL LEVEL GAGE

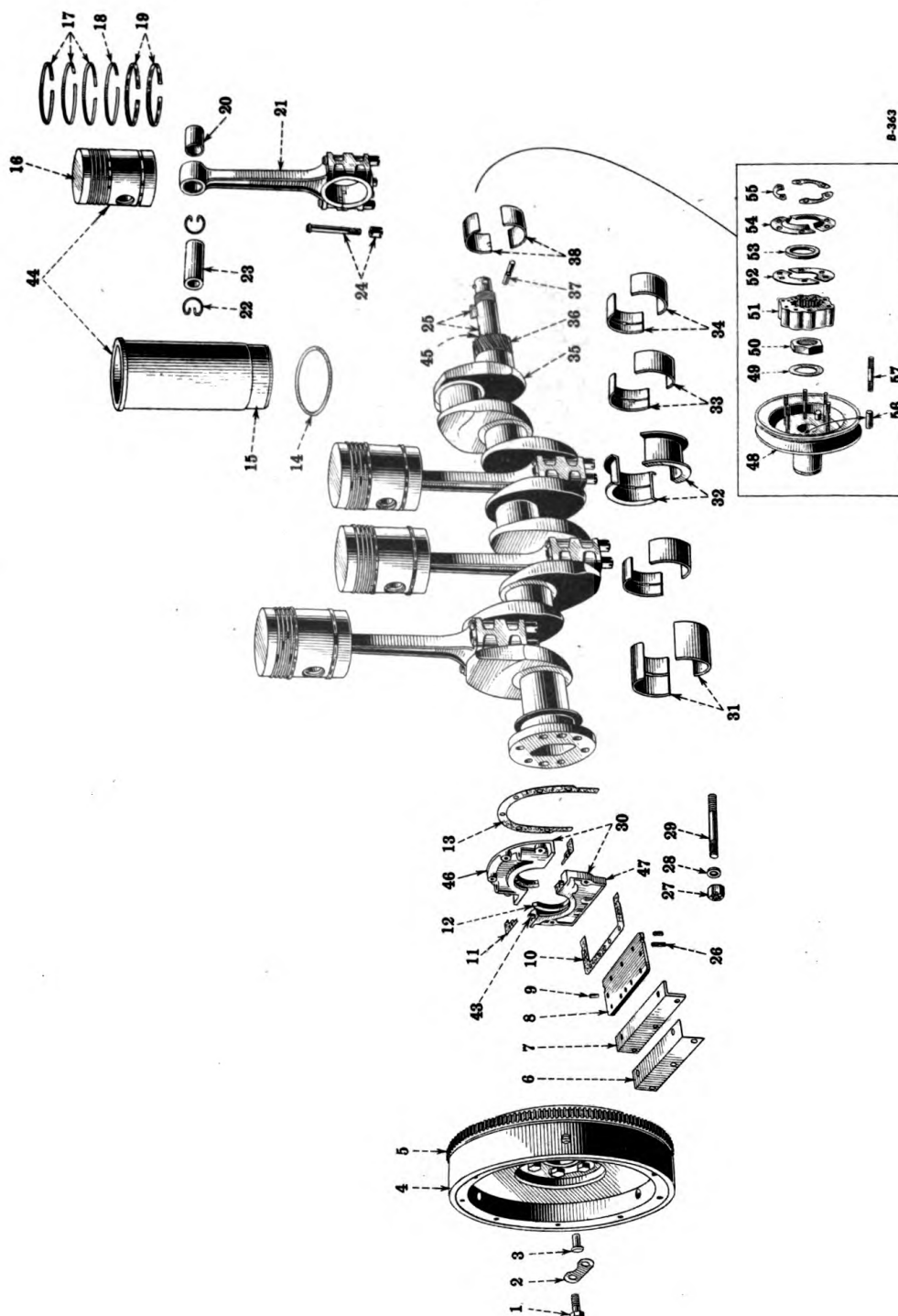
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	57484 D	Lubricating oil pump, complete (includes Ref. Nos. 1 thru 18, less 4 and 9)	1	36.000
1	50371 D	Body	1	11.750
2	50375 D	Idler gear	1	2.000
3	46053 D	Dowel	1	.008
4	50377 DX	Return pipe	1	1.000
...	Q 1800	Cap screw, 3/8" N.C. x 3/4"	2	.035
...	Q 1920	Lock washer, 3/8"	2	.005
5	5312 T3	Pinion pin	1	.020
6	46054 DA	Drive pinion	1	.003
7	13021 D	Key (Woodruff No. 6)	2	.005
8	10961 D	Body cap screw	2	.013
...	Q 1922	Lock washer, 1/2"	2	.813
9	50379 DAX	Oil level gage	1	3.000
10	50372 DX	Drive shaft, with pins	1	.063
11	32319 D	Gear pin	1	.001
12	51223 D	Gasket	1	2.750
13	8008 DX	Gear housing, with dowel	1	7.500
14	51515 D	Auxiliary body gear (12 teeth)	1	7.500
15	51516 D	Auxiliary idler gear (12 teeth)	1	.001
16	50376 D	Gasket	1	3.000
17	8009 D	Cover	1	.080
...	Q 1810	Cap screw, 3/8" N.C. x 2"	4	.005
...	Q 1920	Lock washer, 3/8"	5	.100
...	Q 1820	Cap screw, 3/8" N.C. x 3"	1	.688
18	42791 DA	Pump float	1	.008
...	.....	Cotter, 1/8 x 1-1/2"	1	2.000
19	50374 D	Body gear (12 teeth)	1	

Don't order parts from the illustrations only; refer to the list also.



SPARE PARTS CATALOG

CRANKSHAFT, PISTONS, PISTON RINGS, CONNECTING ROD AND BEARINGS



B-363

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

CRANKSHAFT, PISTONS, PISTON RINGS, CONNECTING ROD AND BEARINGS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	32333 D	Bolt.	6	.250	17	31458 D	Compression ring.	12	.077
2	24943 D	Bolt lock	3	.031	18	42694 D	Compression ring. (taper face).	4	.077
3	32332 D	Dowel	2	.125	19	42219 D	Oil regulating ring	8	.109
4	8420 DX	Flywheel, with ring gear.	1	175.000	20	32942 D	Bushing	4	.218
5	50315 D	Ring gear (146 teeth)	1	8.000	21	42687 DX	Connecting rod, cap and bushing.	4	11.000
6	25096 D	Gasket.	1	.006	22	42687 DY	Connecting rod, cap, bushing and bearing	4	11.875
7	25095 D	Dust seal	1	1.500	23	26916 D	Retainer	8	.010
...	Q 1804	Cap screw, 3/8"N.C. x 1-1/4"	2	.050	24	53612 D	Piston pin (.005" oversize)	4	1.438
...	Q 1920	Lock washer, 3/8"	5	.005	25	28737 DX	Bolt.	16	.313
...	Q 1799	Cap screw, 3/8"N.F. x 3/4"	3	.035	26	.....	Cotter, 3/32 x 1"	16	.002
8	25091 DA	Plate	1	3.250	27	47487 D	Key (woodruff #23).	2	.050
...	Q 1802	Cap screw, 3/8" N.C. x 1"	4	.045	28	25094 D	Stud	3	.063
...	Q 1920	Lock washer, 3/8"	4	.005	29	39423 D	Nut	12	.188
9	25093 DA	Felt plug	2	.001	30	.....	Cotter, 1/8 x 1-3/8"	12	.006
10	25092 DA	Gasket.	1	.000	31	39422 D	Washer.	12	.041
11	32308 D	Gasket.	2	.003	32	43113 D	Stud	12	.975
12	32307 DB	Felt.	2	.063	...	39401 D	Oil seal retainer, with dowels and gasket (optional)	1	4.625
13	32309 D	Gasket.	1	.006	...	62578 D	Oil seal retainer, with dowels and gasket (optional)	1	1.313
14	4222 D	Packing ring.	4	.031	...	48759 D	Bearing, rear	1	1.375
15	3202 DDRXA	Sleeve.	4	16.000	31	64391 D	Bearing, rear (.003" undersize).	1	1.438
...	*5957 DBX	Piston with pin (optional).	4		32	48763 D	Bearing, rear (1/32" undersize).	1	1.625
...	†9323 DX	Piston with pin (optional).	4		...	63294 D	Bearing, center	1	1.250
...	*5957 DBY	Piston with pin and rings (optional).	4		...	64385 D	Bearing, center (.003" undersize)	1	1.438
...	†9323 DY	Piston with pin and rings (optional).	4		...	63295 D	Bearing center (1/32" undersize).	1	1.438
...	†64458 D	Set of 4 pistons with pins and rings.	1		...				
...	†64459 D	Set of 4 pistons with pins.	1		...				

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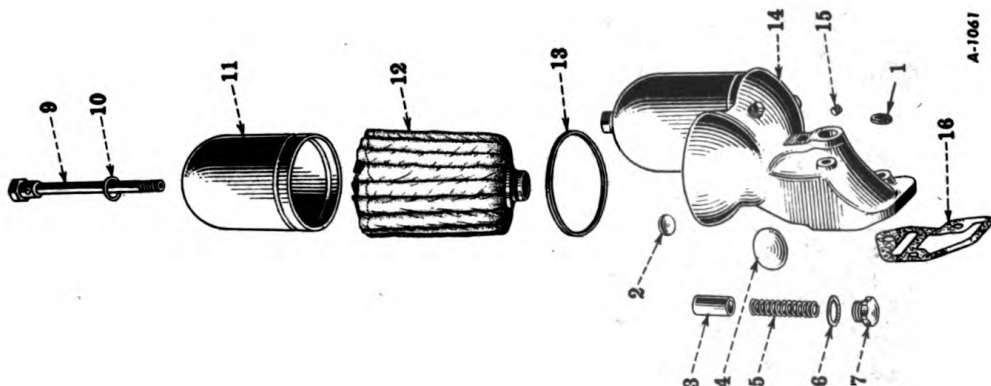
CRANKSHAFT, PISTONS, PISTON RINGS, CONNECTING ROD AND BEARINGS - Continued

33	48757 D 64388 D	Bearing, intermediate Bearing, intermediate (.003" undersize)	2 2	.938 1.250 1.250	...	...	Cap screw, 3/8"N.C. x 1-3/8"	4	.047
	48761 D	Bearing, intermediate (.003" undersize)	2	1.250	...	Q 4018	Cap screw, 3/8"N.C. x 3-1/2"	2	.125
	48756 DA 64384 D	Bearing, front. Bearing, front (.003" undersize)	2 1	.938 .938	...	Q 1920	Lock washer, 3/8" Washer, 13/32" I.D. x 3/4" O.D. x No. 16	6	.005
34	48760 DA	Bearing, front (1/32" undersize)	1	1.250	...	9270 DX	Crankshaft rear oil seal retainer, lower with dowels (option- al)	6	.006
...	63282 D	Crankshaft center bear- ing dowel	1	1.438	...	4994 DAX	Crankshaft rear oil seal retainer, lower with dowels (option- al)	1	4.675
35	53401 DX	Crankshaft, with gear nut	2	.010	47				
	53402 DX	Crankshaft (1/32" under- size) with gear nut	1	175.000	...				
36	25134 DA	Gear (27 teeth)	1	175.000	...				4.625
37	10319 D	Crank pin	1	1.625 .250	...		Cap screw, 3/8" N.C. x 1-3/8"	1	.047
...	42688 DAX 42690 DAX	Headless set screw, 5/16" N.C. x 1/2" Connecting rod bearing. Connecting rod bearing (.030" undersize)	1 4	.004 .878	...	Q 1920	Lock washer, 3/8" Washer, 13/32" I.D. x 3/4" O.D. x No. 16	2 2	.005
38	64368 DX	Connecting rod bearing. (.003" undersize)	4	1.250	48	8120 DAX	Pulley with drive pins	2	.006
	25076 D *43026 DB	Dowel Set of four sleeves and pistons (optional)	2 1	.021	49	4254 DA	Nut lock	1	13.625
43	164456 DA	Set of four sleeves and pistons (optional)	1		50	4253 D	Nut (regular pulley nut)	1	3.375
44	*42695 DB	Sleeve and piston (optional)	4		51	8119 D	Coupling (14 teeth)	1	.015
	164440 DA	Sleeve and piston (optional)	4		52	51268 D	Shaft retainer	2	.004
45	P0 9696	Crankshaft gear key (Woodruff No. 23)	1		53	51269 D	Felt washer	1	.125
	9269 D	Crankshaft rear oil seal upper retainer (optional)	1	4.625	54	51271 D	Felt retainer	2	.047
46	4993 DA	Crankshaft rear oil seal upper retainer (optional)	1	4.625	55	47244 D	Lock	2	.080
					56	47490 D	Pin	2	.004
					57	57715 D	Stud	2	.001
					...	Q 1905	Hex. nut, 3/8" N.F., type B	6	
					* - Aluminum † - Grey iron. ▲ - Note: Use only one type of piston (aluminum or grey iron) in any one engine.				

SPARE PARTS CATALOG

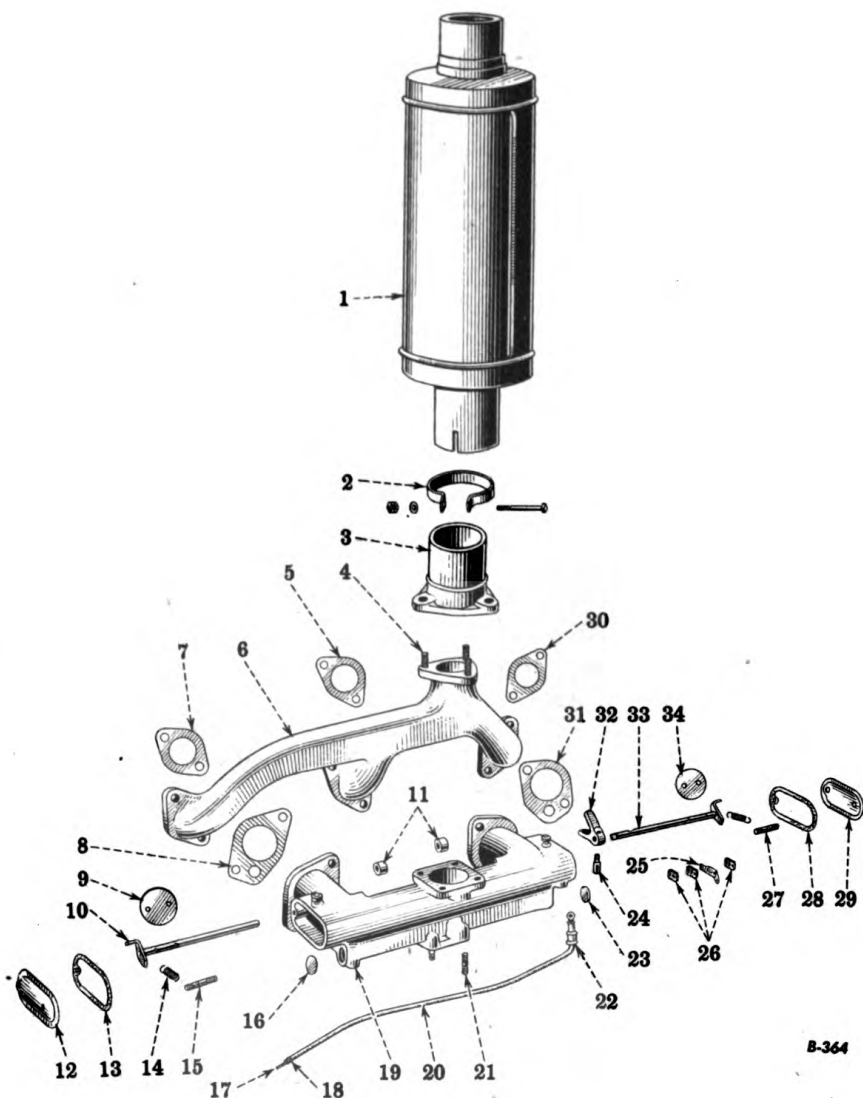
LUBRICATING OIL FILTER

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	51824 D	Oil filter (includes Ref. Nos. 3 and 5 thru 14)	1	25.000
1	25352 D	Base bolt gasket.	1	.003
2	23007 V	Plug (1")	2	.020
3	45285 DA	Regulating valve.	1	.041
4	23139 V	Plug (2")	1	.075
5	45286 D	Valve spring.	1	.063
6	28781 D	Gasket.	1	.003
7	51205 D	Regulating valve nut.	1	.125
9	46606 DX	Retaining bar	2	1.030
10	13839 D	Gasket.	2	3.000
11	13842 D	Case.	2	1.281
12	63884 D	Element (paper)	2	16.000
13	13841 D	Gasket.	2	.145
14	8021 DAX	Base with plugs	1	.013
...	Q 1856	Cap screw, 1/2" N.C. x 2"	1	.250
...	Q 1922	Lock washer, 1/2"	2	.250
...	Q 4046	Cap screw, 1/2" N.C. x 4"	1	.063
...	Q 1866	Cap screw, 1/2" N.C. x 4-1/2"	1	.250
...	50410 DA	Pipe plug, 3/8"	1	.500
15	50410 DA	Pipe plug	1	
16	50404 D	Gasket.	1	



SPARE PARTS CATALOG

MANIFOLDS - INTAKE AND EXHAUST



8-364

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50917 D	Exhaust muffler.	1	7.500
2	23132 D	Clamp.	1	.312
...	Q 1784	Cap screw, 5/16" N.C. x 2"	1	.055
...	Q 1904	Hex. nut, 5/16" N.C.	1	.060
...	Q 1920	Lock washer, 5/16"	1	.003
3	6995 DB	Exhaust pipe	1	3.250
...	Q 1910	Hex. nut, 1/2" N.C.	3	.045
4	50677 D	Stud	3	.078
5	50687 D	Gasket, center	1	.063
6	8055 DX	Exhaust manifold, with studs	1	23.500
...	Q 1910	Hex. nut, 1/2" N.C.	6	.047
7	50688 D	Gasket, end.	1	.063
8	50689 D	Intake gasket.	1	.063

(Continued on next page)

SPARE PARTS CATALOG

Engine - 4

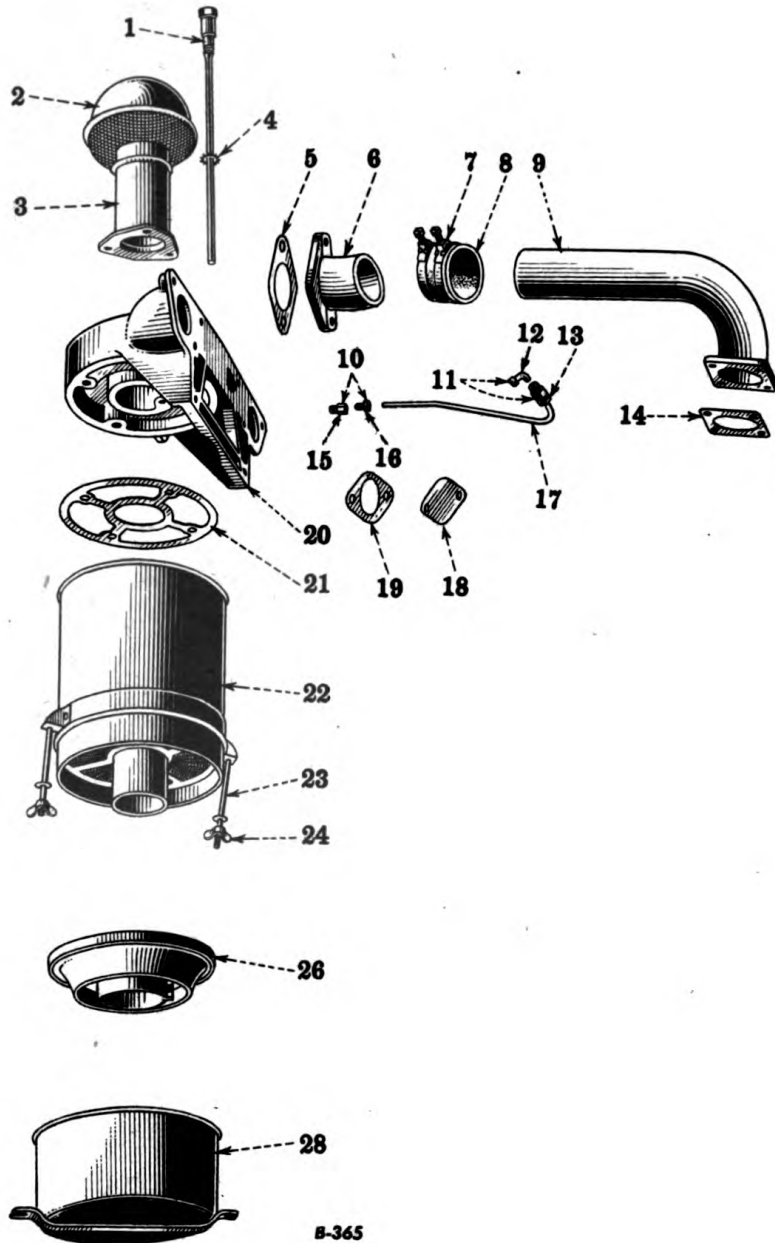
Page 15

MANIFOLDS - INTAKE AND EXHAUST - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
9	50697 D	Butterfly valve.	1	.063
...	.....	Machine screw, No. 8 - 32" N.C. x 3/8"	2	.004
10	53673 DX	Control shaft, rear	1	.375
11	53083 D	Seal	2	.063
12	52519 D	End cover.	1	.188
...	Q 1918	Lock washer, 1/4"	1	.002
...	Q 1903	Hex. nut, 5/16" N.F.	1	.008
...	Q 1919	Lock washer, 5/16"	1	.004
...	Q 1764	Cap screw, 1/4" N.C. x 3/4"	1	.016
13	52520 D	Cover gasket	1	.031
14	56107 D	Spring	2	.016
15	54964 D	Spring stud.	1	.041
16	23007 V	Plug	1	.020
17	1924 T	Terminal	2	.002
18	27618 D	Cable reinforcement.	2	.001
19	8473 DAX	Intake manifold, with studs, plug and seal	1	20.000
...	Q 1910	Hex. nut, 1/2" N.C.	4	.045
...	Q 1903	Hex. nut, 5/16" N.C.	2	.030
...	.....	Oval point headless set screw, 5/16" N.C. x 3/4"	2	.010
20	53262 D	Short circuiting cable	1	.125
...	.....	Cadmium plated fillister head machine screw, No. 10 - 32 x 5/16"	1	.002
...	.....	Round head machine screw, No. 10 - 32 x 3/8"	1	.002
...	.....	Cadmium plated special light lock washer, No. 10.	2	.002
21	50705 D	Stud	4	.021
22	51234 DA	Grommet.	1	.000
23	23007 V	Plug	1	.020
24	42739 DA	Lever pin.	1	.063
...	Q 1901	Hex. nut, 1/4" N.F.	1	.031
25	52515 DA	Contact and terminal plate	1	.004
...	.....	Round head rivet, No. 12 - 3/16"	2	.002
...	.....	Round head machine screw, No. 10 - 32 N.F. x 1/4"	1	.002
...	Q 1916	Lock washer, No. 10.	1	.000
26	52514 D	Insulating plate	2	.003
...	.....	Round head bolt, No. 10 - 24 x 1"	1	.005
...	Q 1917	Lock washer, 3/16"	1	.002
...	.....	Washer, 13/64" I.D. x 1/2" O.D. x No. 18 gage	1	.008
27	54964 D	Spring stud.	1	.041
28	52520 D	Cover gasket	1	.031
29	52519 D	End cover	1	.125
...	Q 1918	Lock washer, 1/4"	1	.002
...	Q 1903	Hex. nut, 5/16" N.F.	1	.008
...	Q 1919	Lock washer, 5/16"	1	.004
...	Q 1756	Cap screw, 1/4" N.C. x 3/4"	1	.016
30	50688 D	Gasket, end.	1	.063
31	50689 D	Intake gasket.	1	.063
32	50698 D	Control lever.	1	.250
33	53672 DX	Control shaft, front	1	.500
...	.....	Round head brass rivet, 1/8 x 3/16".	1	.006
34	50697 D	Butterfly valve.	1	.063
...	.....	Round head machine screw, No. 8 - 32" N.C. x 3/8"	2	.004
...	48716 H	Manifold butterfly valve lock washer (Shakeproof No. 1208)	4	.000
...	2853 Y	Manifold control lever pin lock washer (Shakeproof No. 1114)	1	.001

SPARE PARTS CATALOG

AIR CLEANER AND CONNECTIONS



B-365

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

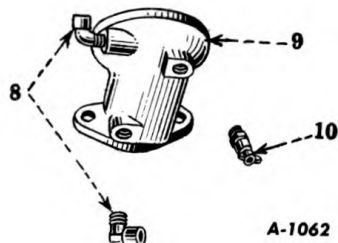
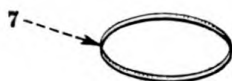
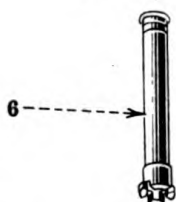
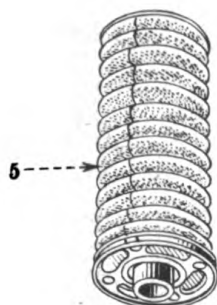
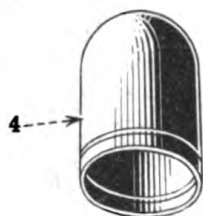
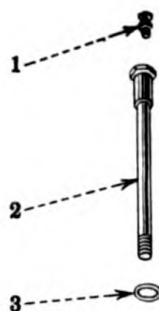
AIR CLEANER AND CONNECTIONS - Continued

Ref. No.	I H C Part No.	Donaldson Co. No.	Description	No. Used	Wt. Lbs.
...	50165 DX	A-914	Air cleaner, 9" (includes Ref. Nos. 22 thru 28).	1	21.750
...	Q 1866		Cap screw, 1/2" N.C. x 4-1/2"	4	.250
...	Q 1922		Lock washer, 1/2"	4	.013
1	55749 DAX		Breather tube extension . . .	1	.313
2	49464 DA		Cap	1	1.375
3	48921 D		Intake pipe	1	1.125
...	Q 1800		Cap screw, 3/8 x 3/4" N.C..	3	.016
...	Q 1920		Lock washer, 3/8"	3	.007
4	47415 H		Lock washer (Shakeproof No. 1128-1)	1	.005
5	50528 D		Gasket	1	.030
6	6994 D		Air cleaner pipe flange . . .	1	2.000
...	Q 1850		Cap screw, 1/2 x 1-1/4" N.C.	2	.077
...	Q 1922		Lock washer, 1/2"	2	.023
7	42613 D		Hose clamp.	2	.063
8	50532 D		Hose, 2-3/4" I.D. x 2-1/4" long	1	.202
9	50527 DX		Pipe.	1	.171
...	Q 1802		Cap screw, 3/8 x 1" N.C..	4	.041
...	Q 1920		Lock washer, 3/8"	4	.007
10	38026 DMX		Connector with nut.	1	.071
11	57068 DX		Elbow with nut.	1	.125
12	57068 D		Elbow	1	
13	37165 D		Coupling.	1	.063
14	50529 D		Gasket.	1	.021
15	38026 DM		Connector	1	.071
16	37165 D		Coupling nut.	1	.031
17	54520 DX		Breather tube, with coupling nut.	1	.031
18	50533 D		Top cover	1	.969
...	Q 1848		Cap screw, 1/2 x 1" N.C..	2	.094
...	Q 1922		Lock washer, 1/2"	2	.008
19	50528 D		Gasket.	1	.030
20	8425 DA		Air cleaner top	1	30.500
...	Q 1848		Cap screw, 1/2 x 1" N.C..	4	.094
...	Q 1922		Lock washer, 1/2"	4	.008
21	50166 D		Gasket.	1	.006
22	54259 D	2P-3510	Body assembly	1	14.000
23	.....		Square head machine bolt, 5/16" N.C. x 5-1/2"	2	.250
24	.....		Wing nut, 5/16" N.C.	2	.031
...	.....		Washer, 5/16"	2	.003
26	67117 D	2P-4886	Housed screen and baffle assembly	1	2.375
...	.....		Fillister head screw, 1/4" N.F. x 1"	1	.155
...	.....		Square nut, 1/4" N.F.	1	
28	54267 D	P-3516	Oil cup (capacity, 5-1/2 pints)	1	.266

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

FUEL OIL FILTER



A-1062

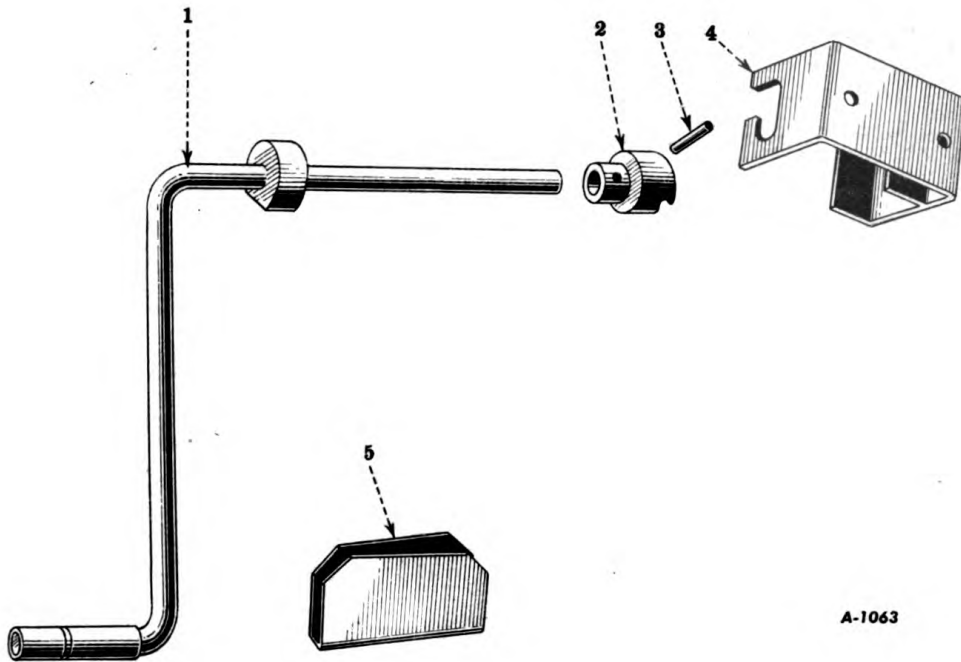
When ordering, always use I H C Part Nos.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	39677 D	Bleeder.	1	.031
2	39577 DA	Stud	1	1.188
3	13839 D	Stud gasket. . . .	1	.006
4	28772 D	Case	1	3.313
5	29501 DA	Cloth element. . .	1	2.875
6	28809 D	Metal element. . .	1	
7	13841 D	Gasket	1	.008
8	37323 DX	Elbow with nut . .	2	.111
	37323 D	Elbow.	2	
9	8045 D	Base	1	5.750
...	Q 1832	Cap screw, 7/16" N.C. x 1-1/4" .	2	.075
...	Q 1921	Lock washer, 7/16"	2	.001
10	9982 T	Drain cock	1	.073

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

STARTING CRANK



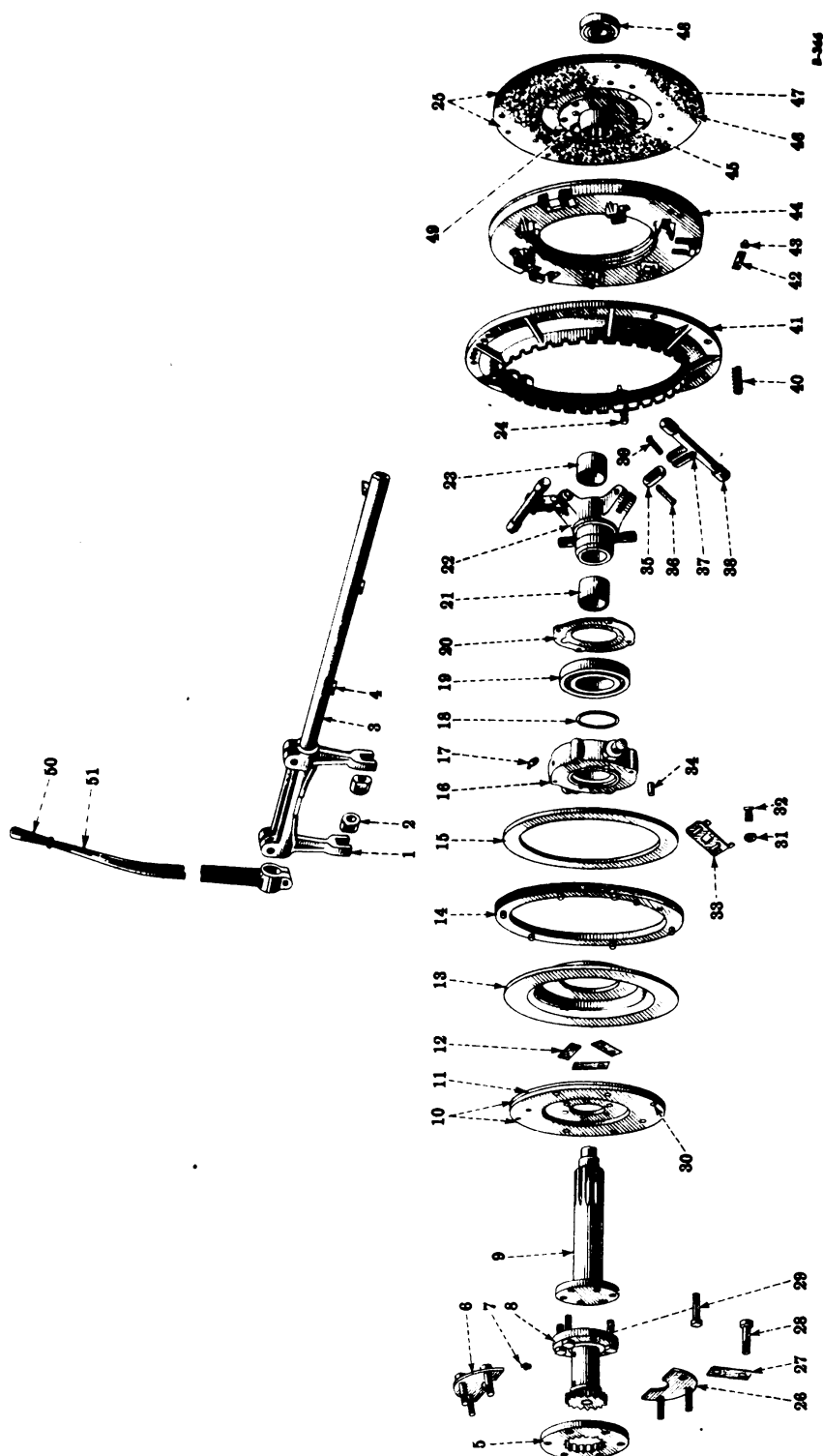
A-1063

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50091 DAX	Starting crank, with ratchet and pin .	1	8.000
2	6935 D	Ratchet.	1	2.875
3	G 3754	Ratchet pin.	1	.015
4	50125 D	Support.	1	4.187
...	Q 1849	Cap screw, 1/2 x 1-1/4" N.F.	2	.110
...	Q 1909	Hex. nut, 1/2" N.F.	2	.031
...	Q 1922	Lock washer, 1/2"	2	.013
5	50124 D	Support clamp.	1	1.062
...	Q 1801	Cap screw, 3/8 x 1" N.F.	2	.050
...	Q 1905	Hex. nut, 3/8" N.F.	2	.015
...	Q 1920	Lock washer, 3/8"	2	.005

SPARE PARTS CATALOG

ENGINE CLUTCH AND CONNECTIONS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

ENGINE CLUTCH AND CONNECTIONS - Continued

Ref. No.	I H C Part No.	Rockford Drilling Mach. Co. No.	Description	No. Used	Wt. Lbs.
...	49971 DD	CLA-1188-AD	Engine clutch, (15") (includes Ref. Nos. 13 thru 25, and 31 thru 47)	1	
...	.....	.....	Cap screw, 1/2 x 1-3/8" N.C.	9	.125
...	Q 1922		Lock washer, 1/2" . . .	9	.012
...	50427 DE	UCLA-5-4305-2	Clutch, complete less driven member assembly	1	
1	5723 DB		Release fork.	1	6.625
...	Q 1874		Cap screw, 5/8 x 2" N.C.	2	.250
...	Q 1925		Lock washer, 5/8" . . .	2	.016
2	42298 DB		Release pin bushing . . .	2	.188
3	49977 D		Release shaft	1	8.250
4	10430 V		Key (Woodruff No. 18) . .	2	.031
5	49974 D		Ring (16 teeth)	1	2.750
6	49975 D		Coupling washer	1	.531
7	Q 3615		Lubricator (Lincoln No. 5000)	1	.016
8	49973 DA		Coupling (16 teeth) . . .	1	5.375
9	53457 D		Shaft	1	9.750
10	40942 DX		Brake disc with facing. .	1	6.500
11	40943 D		Brake facing.	1	.625
12	40974 DA		Coupling bolt lock. . . .	3	.031
13	43198 D	CL-4152	Brake disc.	1	6.375
...	Q 1774	CL-3919	Cap screw, 5/16 - 18 x 3/4"	4	.020
...	Q 1919	CL-3920	Lock washer, 5/16" . . .	4	.003
14	55371 DAX	UCL-4815-1	Adjusting ring with lock and pin.	1	4.313
15	31238 D	CL-3461	Ring plate.	1	3.000
	43197 D	CL-4256	Bearing carrier	1	6.375
16	43197 DX	UCL-4256	Bearing carrier with brake disc, plate, pin and lubricator	1	13.688
	Q 3625		Lubricator (Lincoln No. 5100) (optional) . . .	1	.031
17	14187 DA		Lubricator (Alemite No. 1611) (optional) . . .	1	.012
18	43195 D	CL-3900	Snap ring	1	.047
19	48173 D	CL-4599	Bearing (N.D. No. 3214) .	1	2.406
20	43201 DA	CL-4257-1	Plate	1	.813
...	Q 1774	CL-3919	Cap screw, 5/16 - 18 x 3/4"	4	.020
...	Q 1919	CL-3920	Lock washer, 5/16" . . .	4	.003
21	43194 D	CL-4154	Bushing	1	.250
	50432 DAX	UCL-4450-1	Sleeve with bushings. . .	1	6.875
22	51611 DA	UCL-4450-1AS	Sleeve with bushings, bearing (48173 D) and bearing carrier assembly (43197 DX)	1	22.500
23	43194 D	CL-4154	Bushing	1	.250
24	61131 D	CL-5329	Return spring bolt. . . .	3	.031
...	Q 1903	CL-3336	Hex. nut, 5/16" N.F. . .	6	.008
...	.....	CL-3923	Cotter, 1/16 x 1/2" . . .	6	.001

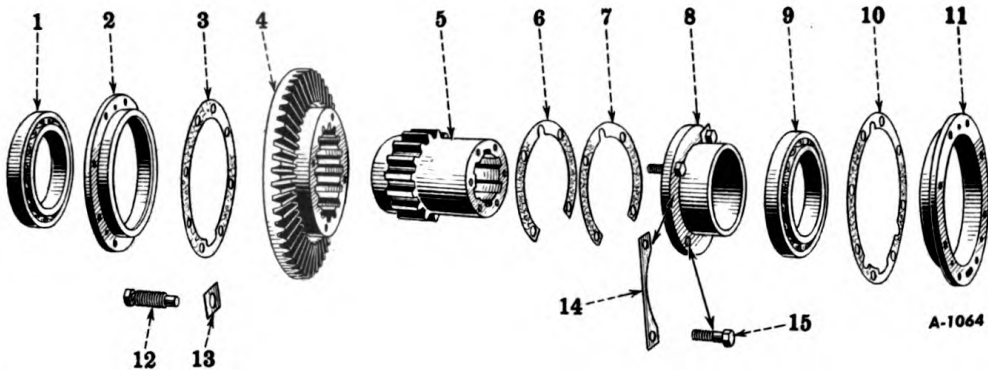
SPARE PARTS CATALOG

ENGINE CLUTCH AND CONNECTIONS - Continued

Ref. No.	I H C Part No.	Rockford Drilling Mach. Co. No.	Description	No. Used	Wt. Lbs.
25	50423 DX	CL-4279	Clutch facing package . .	1	4.313
26	49975 D		Coupling washer	1	.531
27	49976 DA		Bolt lock	3	.047
28	40945 D		Bolt	6	.125
...	Q 1909		Hex. nut, 1/2" N.F. . .	6	.031
29	40945 D		Coupling bolt	6	.125
...	Q 1919		Hex. nut, 1/2" N.F. . .	6	.031
30	21444 H		Rivet	8	.002
31	27166 H	CL-1608	Lock nut.	2	.010
32	61115 D	CL-5215	Lock bolt	2	.040
33	61127 D	CL-5223	Lock	1	.050
34	43139 D	CL-4052	Dowel pin	2	.025
35	43207 D	CL-4339-1	Link	3	.002
36	43211 D	CL-4340	Pin, long	3	.188
...	.....	CL-4397	Cotter, 1/8 x 5/8". . .	3	.003
...	.....	CL-4347	Washer, 3/8" I.D. x 7/8" O.D. x 16 ga.	3	.010
37	{ Q 3627 27838 D }	CL-5028	Lubricator (Lincoln No. 5318) (optional) . . .	3	.016
			Lubricator (Alemite No. 1656) (optional) . . .	3	.016
			Camshaft assembly (set of 3)	1	3.625
38	59996 DX	UCL-1-4337-S3A	Camshaft (set of 3) and blocks (set of 6) . . .	1	
39	N 32202	CL-4341	Pin, short.	3	.063
...	.....	CL-4597	Cotter, 1/8 x 5/8". . .	3	.003
...	.....	CL-4347	Washer, 3/8" I.D. x 7/8" O.D. 16 ga.	3	.010
40	50424 D	CL-4300	Return spring	3	.030
41	50426 DA	CL-4305-2	Back plate.	1	16.500
42	43248 D	UCL3478-S-6	Cam block	6	.026
...	.....	CL-3921	Fillister head screw, 1/4" - 20 x 1/2" . . .	6	.001
43	54953 D	CL-4799	Lock	6	.004
44	51610 DB	UCL-4304-4	Pressure plate with cam blocks and screws. . .	1	31.500
45	39361 D	CL-2167	Rivet	12	
46	43247 D	CL-1011-2	Rivet	30	.375
47	50392 D	UCL4-2086	Driven member assembly. .	1	13.000
48	11669 K		Pilot bearing (New Departure No. 7306). . .	1	.875
49	31538 H	CL-2086	Clutch plate center . . .	1	
50	41597 D		Clutch lever rubber handle used on 6919 DX only).	1	.150
51	{ 6919 DX 9650 D }		Engine clutch lever with rubber handle (optional).	1	
			Engine clutch lever with steel handle (optional) Cap screw, 5/8" N.F. x 2-5/8"	1	
...	.....		Hex. nut, 5/8" N.F. . . .	1	.127
...	Q 1911		Lock washer, 5/8"	1	
...	Q 1925		Lubricating fitting (Lincoln No. 5100). . .	1	.031
...	Q 3625	CL-4475	Engine clutch and lever key (Woodruff No. 18). .	1	
...	10430 V				

SPARE PARTS CATALOG

DRIVE BEVEL GEAR ASSEMBLY

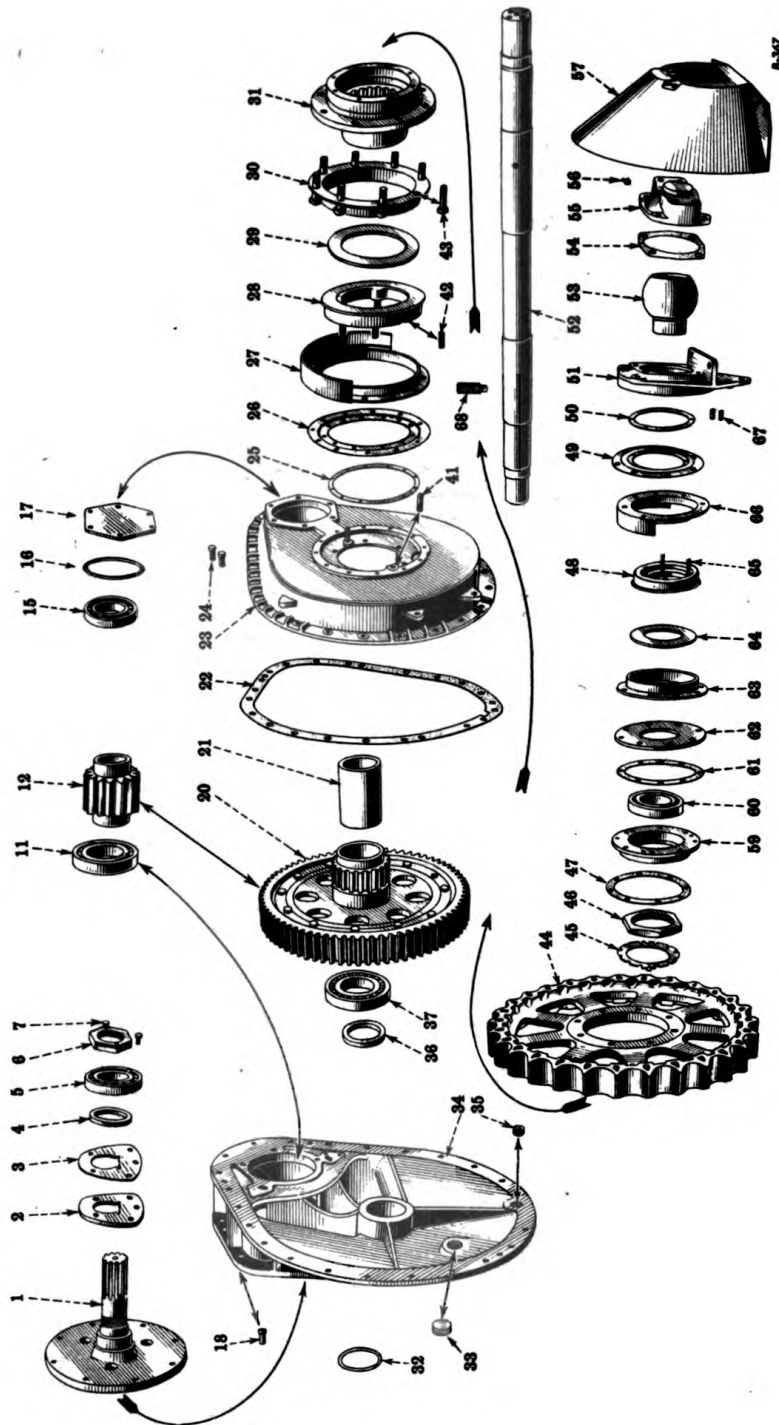


Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	52401 D	Bearing (New Departure No. 3L-38-A).	1	7.625
2	8396 D	Bearing cage, left hand.	1	6.250
3	51554 D	Gasket	1	.031
4	64628 D	Bevel pinion and shaft with drive bevel gear.	1	81.000
5	8395 D	Hub.	1	26.750
6	52396 D	Shim, heavy.	4	.031
7	52397 D	Shim, light.	As req'd	.046
8	53675 D	Spacer	1	9.500
9	52401 D	Bearing (New Departure No. 3L-28-A).	1	7.625
10	51554 D	Gasket	1	.031
11	8397 D	Bearing cage, right hand	1	6.000
12	49849 D	Set screw.	1	.500
...	.....	Hex. jam nut, 1" N.F.	1	.156
13	49850 D	Set screw lock	1	.062
14	52399 DA	Nut lock	2	.046
15	52398 D	Bolt	4	.250
...	Q 1911	Hex. nut, 5/8" N.F.	4	.062

SPARE PARTS CATALOG

SPROCKET DRIVE ASSEMBLY



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

Final Drive - 6

Page 3

SPROCKET DRIVE ASSEMBLY - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	52347 DA	Pinion shaft.	2	43.000	24	64801 D	Dowel pin	4	.312
2	9475 DX	Bearing retainer with oil seal	2	5.250	25	53445 D	Retainer.	2	.062
...	.....	Cap screw, 1/2" N.C. x 1-3/8"	10	.125	...	Q 4000	Cap screw, 1/4" N.C. x 5/8"	20	.015
...	Q 1922	Lock washer, 1/2"	10	.013	...	Q 1918	Lock washer, 1/4"	20	.002
3	64817 D	Bearing retainer gasket	2	.031	26	53444 D	Diaphragm	2	.031
4	52348 D	Oil seal.	2	.406	27	53455 D	Guard	2	4.750
5	40940 D	Bearing (N.D. No. 7514)	2	2.500	...	Q 1800	Cap screw, 3/8" N.C. x 3/4"	20	.035
6	49857 D	Bearing nut	2	1.375	...	Q 1920	Lock washer, 3/8"	20	.005
7	10722 D	Lock bolt	4	.031	28	8431 D	Pressure plate.	2	8.750
11	17462 H	Bearing (N.D. No. 1217)	2	12.750	29	53440 D	Packing	2	.343
12	64493 D	Pinion (13 teeth)	2		30	53439 D	Deflector	2	2.094
15	17462 H	Bearing (N.D. No. 1217)	2		31	53438 DA	Carrier	2	44.000
16	64816 D	Packing ring.	2	.020	32	49801 D	Ring (track frame pivot shaft)	2	.031
17	9476 DX	Cap with packing ring	2	6.625	33	.....	Plug, 1-1/2"	1	.281
...	.....	Cap screw, 1/2" N.C. x 1-3/8"	12	.125	...	Q 1870	Carrier with pipe plugs.	2	325.000
...	Q 1922	Lock washer, 1/2"	12	.013	...	Q 1852	Cap screw, 5/8" N.C. x 1-1/2"	2	.191
18	64803 D	Pin	4	.250	...	Q 1872	Cap screw, 1/2" N.C. x 1-1/2"	4	.120
20	64495 D	Gear (73 teeth) and carrier.	2	140.000	34	Q 1925	Cap screw, 5/8" N.C. x 1-3/4"	10	.200
...	.....	Round head rivet, 5/8 x 2-1/8"	20	.250	...	.....	Lock washer, 5/8"	10	.024
21	49868 D	Spacer, long.	2	8.125	...	.....	Standard ctsk. head pipe plug, 1-1/2"	2	.125
22	64820 D	Gasket.	2	.008	...	.....	Standard ctsk. head pipe plug, 3/4"	2	.281
23	9478 DX	Cover with anchor pins	2	145.000	35	58997 D	Plug, 3/4"	2	.125
...	Q 1849	Cap screw, 1/2" N.F. x 2"	38	.110	36	49864 D	Spacer, short	2	1.500
...	Q 1909	Hex. nut, 1/2" N.F.	32	.037	37	49876 D	Bearing (N.D. No. 1219-85)	2	7.250
...	Q 1922	Lock washer, 1/2"	38	.013	41	52419 D	Anchor pin.	4	.111
...	64802 D	Dowel pin	6	.218	42	41608 D	Spring.	8	.500
...					43	49879 DA	Bolt.	16	.500

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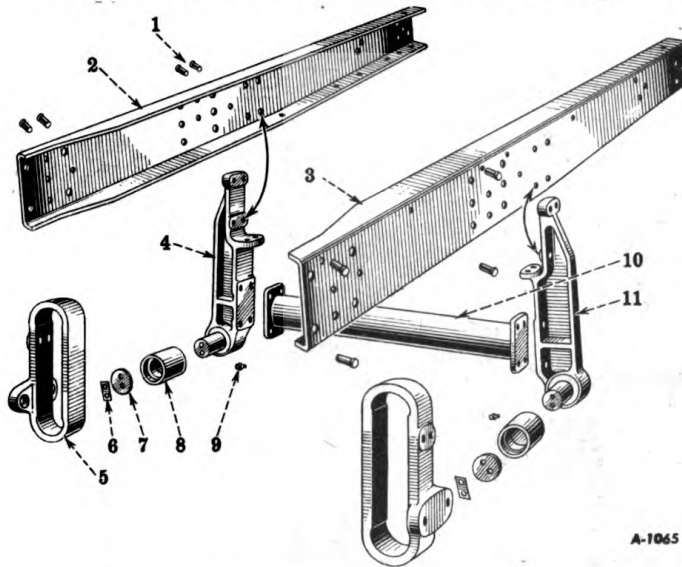
SPARE PARTS CATALOG

SPROCKET DRIVE ASSEMBLY - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
44	8784 DA	Sprocket (27 teeth)	2	177.000	...	Q 1924	Lock washer, 9/16"	8	.031
45	49882 D	Lock.	2	.312	...	Q 1864	Cap screw, 1/2"		.200
46	53613 DA	Nut	2	2.000	...	N.C. x 3/4"	Lock washer, 1/2"	4	.031
47	53447 D	Gasket	2	.032	59	Q 1922	Cage.	4	11.375
48	8432 D	Pressure plate.	2	5.156	60	8430 DA	Bearing (N.D. No. 1216)	2	.032
49	53450 D	Diaphragm	2	.093	61	40039 V	Gasket.	2	6.000
50	53451 D	Retainer.	2	.312	62	53447 D	Retainer.	4	1.625
...	Q 4000	Cap screw, 1/4"		.014	63	53446 D	Deflector (track frame)	2	
...	Q 1918	N.C. x 5/8"	16	.002	...	Q 1853	Cap screw, 1/2"	16	.125
51	8433 DA	Lock washer, 1/4"	16		...	N.F. x 1-3/4"	Lock washer, 1/2"	16	.031
...	Q 1871	Bracket	2		64	Q 1922	Packing	2	.250
...	Q 1911	Cap screw, 5/8"	10		65	53449 D	Spring.	8	.031
...	Q 1925	Hex. nut, 5/8" N.F.	10		66	41619 D	Guard	2	2.750
52	52332 D	Lock washer, 5/8"	10		...	Q 1800	Cap screw, 3/8"	16	.031
...	Q 1871	Track frame pivot shaft.	1	226.000	...	N.C. x 3/4"	Lock washer, 3/8"	16	.005
53	6982 D	Pivot bearing	2	10.375	67	Q 1920	Anchor pin.	4	.028
...	Q 1871	Cap screw, 5/8"	8	.225	...	54110 D	Sprocket carrier bolt nut.	16	.187
...	Q 1925	N.F. x 1-3/4"	8	.024	...	21555 H	Sprocket carrier bolt lock washer (Shakeproof No. 1132).	16	.006
54	49802 D	Lock washer, 5/8"	2	.296	...	Q 1922	Lock washer, 1/2"	16	.031
55	6984 DAX	Gasket (track pivot).	2	10.906	...	47415 H	Sprocket drive carrier lock washer (Shakeproof No. 1128).	14	.005
...	Q 1888	Cap (track pivot)	2		...	49763 D	Sprocket drive carrier stud nut.	16	.031
...	Q 1927	Cap screw, 3/4"	8	.308	...	Q 1922	Lock washer	16	
56	Q 3615	N.C. x 1-3/4"	8	.045	...	Q 1922	Sprocket drive carrier lock washer (Shakeproof No. 1128).	14	.005
...	Q 1927	Lock washer, 3/4"	2	.015	...	49763 D	Sprocket drive carrier stud nut.	16	.031
57	52357 DX	Lubricator (track pivot) (Lincoln No. 5000).	2	18.000	...	Q 1922	Lock washer, 1/2"	16	
...	Q 4076	Shield (sprocket)	2		...	Q 1922	Lock washer, 1/2"	16	
...	...	Cap screw, 9/16"	8	.046	...	Q 1922	Lock washer, 1/2"	16	
...	...	N.F. x 1-1/4"	8	.031	...	Q 1922	Lock washer, 1/2"	16	
...	...	Hex. nut, 9/16" N.F.	8		...	Q 1922	Lock washer, 1/2"	16	

SPARE PARTS CATALOG

TRACK FRAME GUIDE, ROLLER AND BRACKET, AND MAIN FRAME SIDE CHANNEL



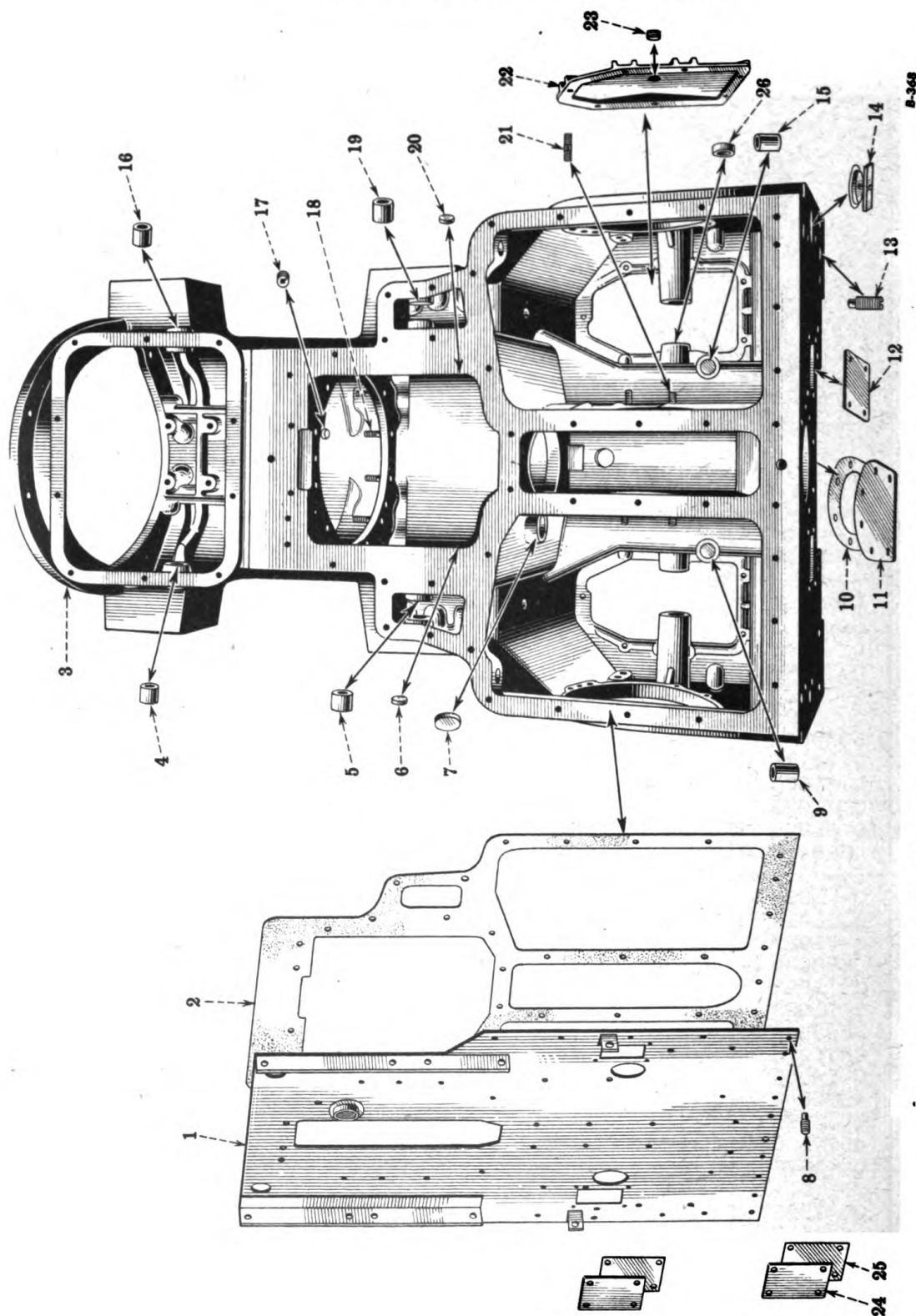
A-1065

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	49999 D	Dowel.	4	.406
2	52394 D	Channel, left hand	1	115.000
...	Q 4146	Cap screw, 7/8" N.C. x 2"	4	.468
...	Q 1870	Cap screw, 5/8 x 1-1/2" N.C.	4	.191
...	Q 1929	Lock washer, 7/8"	4	.005
...	Q 1925	Lock washer, 5/8"	4	.023
3	52395 D	Channel, right hand.	1	115.000
...	Q 4146	Cap screw, 7/8" N.C. x 2"	4	.468
...	Q 1870	Cap screw, 5/8 x 1-1/2" N.C.	4	.191
...	Q 1929	Lock washer, 7/8"	4	.005
...	Q 1925	Lock washer, 5/8"	4	.023
* 4	6884 DAX	Bracket, with shaft (left hand)	1	38.000
...	.....	Cap screw, 3/4 x 2-5/8" N.F.	2	.437
...	Q 1889	Cap screw, 3/4 x 2" N.F.	4	.358
...	Q 1913	Hex. nut, 3/4" N.F.	6	.120
...	Q 1927	Lock washer, 3/4"	6	.004
* 5	6886 D	Guide.	2	31.562
...	Q 1897	Cap screw, 7/8 x 1-3/4" N.F.	8	.475
...	Q 1929	Lock washer, 7/8"	8	.005
* 6	35089 D	Cap screw lock	2	.025
* 7	49769 D	Washer	2	.250
...	Q 4050	Cap screw, 1/2 x 7/8" N.F.	4	.093
* 8	49768 D	Roller	2	4.375
* 9	Q 3615	Lubricator (Lincoln No. 5000)	2	.015
*10	49771 DXA	Bracket brace.	1	31.000
...	Q 1873	Cap screw, 5/8 x 2" N.F.	8	.250
...	Q 1911	Hex. nut, 5/8" N.F.	8	.085
...	Q 1925	Lock washer, 5/8"	8	.023
*11	6885 DAX	Bracket, with shaft, right hand.	1	37.000
...	.....	Cap screw, 3/4 x 2-5/8" N.F.	2	.437
...	Q 1889	Cap screw, 3/4 x 2" N.F.	4	.358
...	Q 1913	Hex. nut, 3/4" N.F.	6	.120
...	Q 1927	Lock washer, 3/4"	6	.040

* - These items are not used if the tractor is equipped with a "Rigid Track Frame Attachment" (see page 8).

SPARE PARTS CATALOG

MAIN FRAME AND COVERS



Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

Frame - 7
Page 3

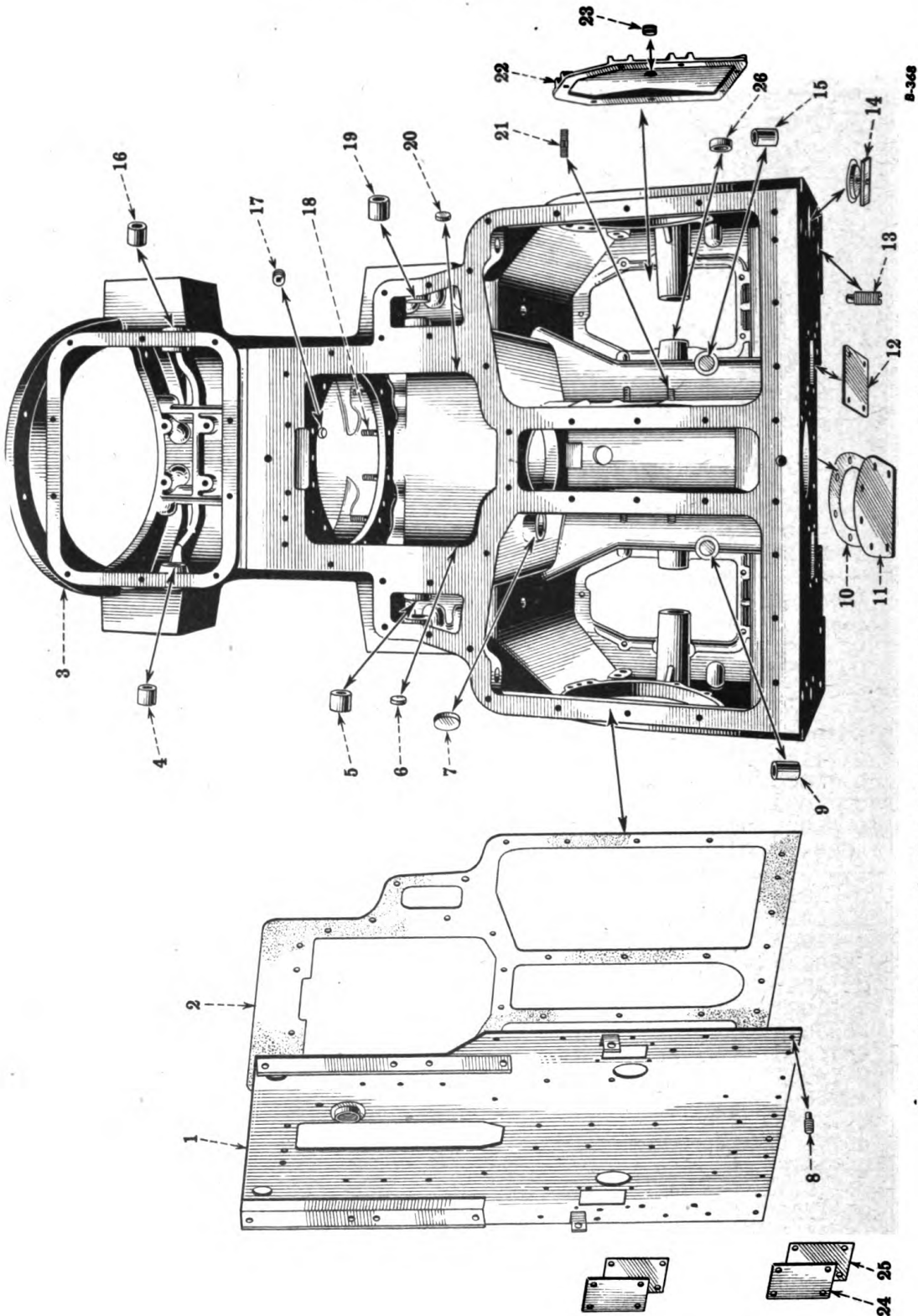
MAIN FRAME AND COVERS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	56021 DXA	Main frame cover	1	98.000	16	41598 D	Engine clutch release shaft bushing	1	.156
...	Q 1850	Cap screw, 1/2" N.C. x 1-1/4"	33	.105	17	4926 DA	Engine clutch component drain plug	1	.108
...	Q 1922	Lock washer, 1/2"	41	.013	18	52387 D	Transmission end cover stud	4	.125
...	Q 1846	Cap screw, 1/2" N.C. x 3/4"	8	.085	19	41599 D	Steering brake lever outer bushing	2	.077
2	52392 D	Main frame cover gasket	1	.421	20	41600 D	Steering brake operating shaft plug	1	.015
3	6900 DHX	Main frame	1	1585.000	21	49997 D	Bevel gear bearing cage stud	4	.125
4	41598 D	Engine clutch release shaft bushing	1	.156	22	6913 DA	Steering brake inspection cover	2	17.187
5	41599 D	Steering brake lever outer bushing	2	.077	...	Q 1852	Cap screw, 1/2" x 1-1/2" N.C.	14	.120
6	41600 D	Steering brake operating shaft plug	1	.015	...	Q 1922	Lock washer, 1/2"	14	.013
7	49998 D	Transmission reverse idler shaft plug	1	.125	23	4926 DA	Steering brake inspection cover drain plug	2	.108
8	18585 DA	Main frame cover dowel pin	2	.125	24	56011 D	Steering clutch inspection cover	2	1.000
9	42000 D	Steering clutch release shaft bushing	1	.108	...	Q 1771	Cap screw, 5/16" x 1/2" N.F.	8	.025
*10	42289 D	Power take-off cover gasket	1	.625	25	Q 1919	Lock washer, 5/16"	8	.003
*11	42288 D	Power take-off cover	1	4.750	26	56014 D	Steering clutch inspection cover gasket	2	.001
...	Q 1884	Cap screw, 3/4" x 1-1/4" N.C.	6	.258	...	41162 D	Steering brake pivot shaft cup plug	2	.015
...	Q 1927	Lock washer, 3/4"	6	.075	...	57384 D	Drawbar guide bracket stud, lower	4	.500
12	42290 D	Main frame rear inspection cover	2	.875	...	57385 D	Drawbar guide bracket stud, upper	2	.687
...	Q 1800	Cap screw, 3/8" x 3/4" N.C.	8	.035	...	59119 D	Socket head pipe plug, (magnetic)	1	.562
...	Q 1920	Lock washer, 3/8"	8	.005	...	64815 D	Sprocket drive carrier and cover stud	16	.125
13	40998 DA	Track frame pivot shaft set screw	2	.250					
...	.....	Hex. jam nut, 3/4" N.C.	2	.003					
14	42297 D	Steering clutch lubricating port cover	2	.531					
15	42000 D	Steering clutch release shaft bushing	1	.108					

* - These items are not used if the tractor is equipped with a "Power Take-Off Attachment (see Section 9, page 2).

SPARE PARTS CATALOG

MAIN FRAME AND COVERS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

8-348

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

Frame - 7
Page 3

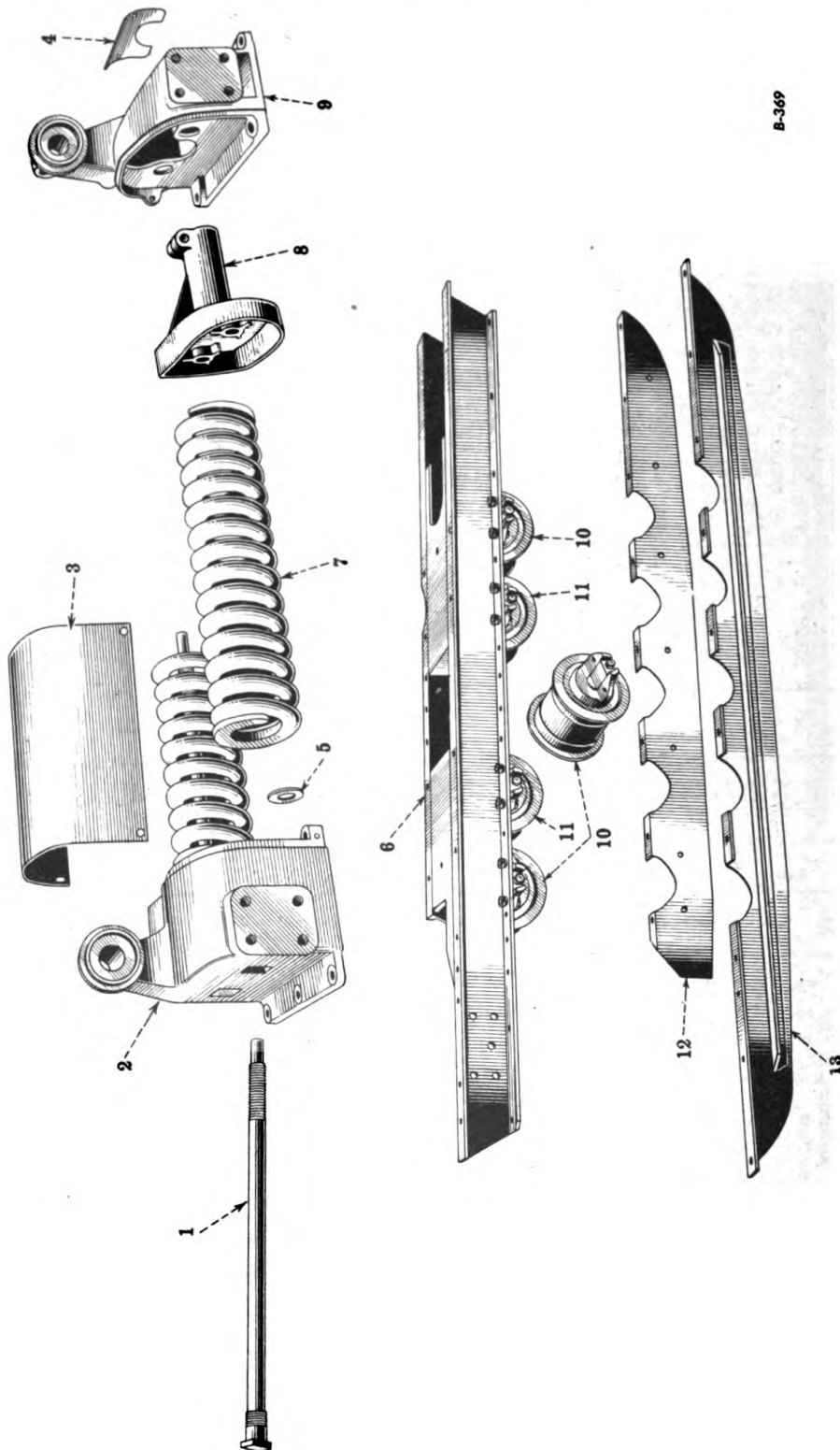
MAIN FRAME AND COVERS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	56021 DXA	Main frame cover . . .	1	98.000	16	41598 D	Engine clutch release shaft bushing . . .	1	.156
...	Q 1850	Cap screw, 1/2" N.C. x 1-1/4" . . .	33	.105	17	4926 DA	Engine clutch compartment drain plug	1	.108
...	Q 1922	Lock washer, 1/2" . . .	41	.013	18	52387 D	Transmission end cover stud . . .	4	.125
...	Q 1846	Cap screw, 1/2" N.C. x 3/4" . . .	8	.085	19	41599 D	Steering brake lever outer bushing . . .	2	.077
2	52392 D	Main frame cover gasket	1	.421	20	41600 D	Steering brake operating shaft plug . . .	1	.015
3	6900 DHX	Main frame . . .	1	1585.000	21	49997 D	Bevel gear bearing cage stud . . .	4	.125
4	41598 D	Engine clutch release shaft bushing . . .	1	.156	22	6913 DA	Steering brake inspection cover . . .	2	17.187
5	41599 D	Steering brake lever outer bushing . . .	2	.077	...	Q 1852	Cap screw, 1/2" x 1-1/2" N.C. . .	14	.120
6	41600 D	Steering brake operating shaft plug . . .	1	.015	...	Q 1922	Lock washer, 1/2" . . .	14	.013
7	49998 D	Transmission reverse idler shaft plug . . .	1	.125	23	4926 DA	Steering brake inspection cover drain plug . . .	2	.108
8	18585 DA	Main frame cover dowel pin . . .	2	.125	24	56011 D	Steering clutch inspection cover . . .	2	1.000
9	42000 D	Steering clutch release shaft bushing	1	.108	...	Q 1771	Cap screw, 5/16" x 1/2" N.F. . .	8	.025
*10	42289 D	Power take-off cover gasket . . .	1	.625	...	Q 1919	Lock washer, 5/16" . . .	8	.003
*11	42288 D	Power take-off cover . . .	1	4.750	25	56014 D	Steering clutch inspection cover	2	.001
...	Q 1884	Cap screw, 3/4" x 1-1/4" N.C. . .	6	.258	26	41162 D	Steering brake pivot shaft cup plug . . .	2	.015
...	Q 1927	Lock washer, 3/4" . . .	6	.075	...	57384 D	Drawbar guide bracket stud, lower . . .	4	.500
12	42290 D	Main frame rear inspection cover . . .	2	.875	...	57385 D	Drawbar guide bracket stud, upper . . .	2	.687
...	Q 1800	Cap screw, 3/8" x 3/4" N.C. . .	8	.035	...	59119 D	Socket head pipe plug, (magnetic) . . .	1	.562
...	Q 1920	Lock washer, 3/8" . . .	8	.005	...	64815 D	Sprocket drive carrier and cover stud . . .	16	.125
13	40998 DA	Track frame pivot shaft set screw . . .	2	.250					
...	.....	Hex. jam nut, 3/4" N.C. . .	2	.003					
14	42297 D	Steering clutch lubricating port cover . . .	2	.531					
15	42000 D	Steering clutch release shaft bushing	1	.108					

* - These items are not used if the tractor is equipped with a "Power Take-Off Attachment (see Section 9, page 2).

SPARE PARTS CATALOG

TRACK FRAME AND SPRINGS



*(Right hand shields are shown.)

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

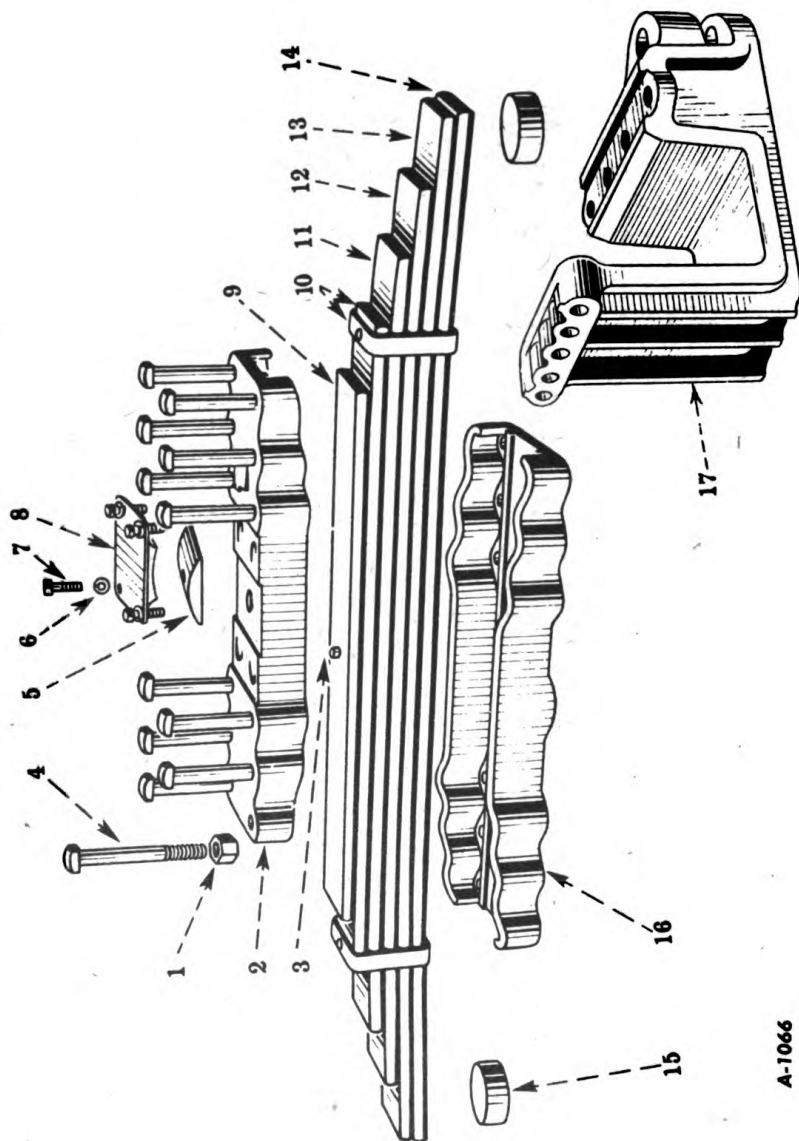
TRACK FRAME AND SPRINGS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	55445 D	Adjusting rod	4	3.500		6871 DBX	Guide, For tractors not L.H. equipped with "Rigid Guide, Track Frame Attachment".	1	80.000
...	.....	Castle hex. nut, 1-1/4" N.F.	4	.500		6872 DBX	Guide, R.H.	1	80.000
...	.....	Cotter, 5/32 x 2"	4	.016		.....	Cap screw, 5/8" N.F. x 3-5/8"	2	.375
2	{ 6868 DCX	Spring retainer, left hand.	1	100.000		Q 1895	Cap screw, 7/8" N.F. x 1-1/2"	2	.437
...	{ 6869 DCX	Spring retainer, right hand.	1	100.000		Q 4164	Cap screw, 7/8" N.F. x 2-1/4"	4	.531
...	Q 1895	Cap screw, 5/8 x 3-5/8" N.F.	2	.187		Q 4167	Cap screw, 7/8" N.F. x 3"	4	.687
...	.....	Cap screw, 3/4 x 2-1/2" N.F.	2	.300		Q 1911	Hex. nut, 5/8" N.F.	2	.085
...	.....	Cap screw, 3/4 x 3" N.F.	4	.375		.....	Hex. nut, 7/8" N.F.	8	.156
...	Q 1911	Hex. nut, 5/8"	4	.437		Q 1925	Lock washer, 5/8"	2	.024
...	Q 1913	Hex. nut, 3/4"	2	.120		Q 1929	Lock washer, 7/8"	10	.050
...	Q 1925	Lock washer, 5/8"	2	.024		8965 DX	Support, For Tractors front, L.H. equipped with "Rigid Track		
...	Q 1927	Lock washer, 3/4"	10	.045		8966 DX	Support, R.H. equipped with "Rigid Track		
3	49733 DA	Spring guard.	4	20.500		.....	Cap screw, 5/8" N.F. x 3-5/8"	1	
...	Q 4042	Cap screw, 1/2 x 7/8" N.C.	4	.094		.....	Cap screw, 7/8" N.F. x 2-1/8"	2	.085
...	Q 1922	Lock washer, 1/2"	8	.013		Q 4166	Cap screw, 7/8" N.F. x 2-3/4"	4	.156
...	.....	Washer, 17/32" I.D. x 1"	8	.085		Q 4168	Cap screw, 7/8" N.F. x 3-1/4"	4	.024
4	49732 DA	O.D. x No. 14 gage	8	.100		.....	Hex. nut, 5/8" N.F.	8	.050
...	Q 1798	Cover	2	.625		Q 1925	Lock washer, 5/8"	2	
...	Q 1920	Cap screw, 3/8 x 1-1/2" N.C.	4	.350		Q 1929	Lock washer, 7/8"	10	
5	55446 D	Lock washer, 3/8"	4	.005		52364 D	Track roller, with shaft and carrier (single flange) (Nos. 1, 3 and 5)	6	109.125
...	.....	Lock washer	4	.875		52365 D	Track roller, with shaft and carrier (double flange) (Nos. 2 and 4)	4	115.125
6	{ 52362 DB	Hex. jam nut, 1-1/2" N.F.	1	245.000		{ 53992 DAX	Shield, inner, left hand.	1	75.000
...	{ 52363 DB	Frame, complete, left hand.	1	345.000		{ 53993 DAX	Shield, inner, right hand.	1	75.000
7	49729 DA	Spring.	4	110.000		.....	Cap screw, 9/16 x 1-5/8" N.F.	16	.156
8	6870 DA	Retainer, front.	2	32.000		.....	Hex. nut, 9/16" N.F.	16	.031
...	Q 4134	Cap screw, 3/4 x 3-1/4" N.F.	2	.531		.....	Lock washer, 9/16"	16	.031
...	Q 1913	Hex. nut, 3/4" N.F.	2	.875		{ 53994 DAX	Shield, outer, left hand.	1	90.000
...	Q 1927	Lock washer, 3/4"	2	.007		{ 53995 DAX	Shield, outer, right hand.	1	90.000
...	.....	.....	2			.....	Cap screw, 9/16 x 1-5/8" N.F.	22	.156
...	.....	.....	2			.....	Hex. nut, 9/16" N.F.	22	.031
...	.....	.....	2			Q 1924	Lock washer, 9/16"	22	.031

SPARE PARTS CATALOG

EQUALIZER SPRING

NOTE: If the tractor is equipped with a Rigid Track Frame (see page 8) the Equalizer Spring is not used.



A-1066

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

SPARE PARTS CATALOG

Frame - 7
Page 7

EQUALIZER SPRING - Continued

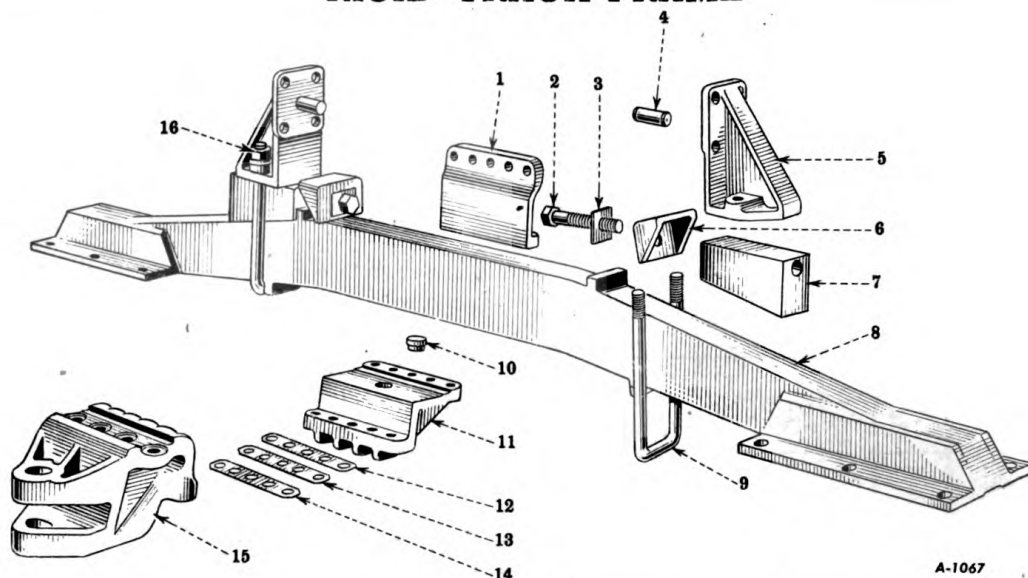
If the tractor is equipped with a Rigid Track Frame (see page 8) the parts listed below are not used.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	49775 D	Equalizer spring, complete (6 leaves).	1	236.50
1	41842 D	Bolt nut	20	80.00
2	6888 DX	Saddle, upper	1	.37
3	49779 DX	Center bolt	1	1.50
4	49773 D	Saddle bolt	20	3.62
5	49776 D	Wearing plate	1	.08
...	.....	Countersunk head iron rivet, 3/8 x 1-1/2"	2	.03
6	.....	Lock washer, 9/16"	4	.18
7	49778 D	Dowel bolt	4	4.25
8	49777 D	Pad, upper	1	25.00
9	49821 D	No. 6 leaf	1	35.00
10	49820 D	No. 5 leaf with clip	1	37.00
11	49819 D	No. 4 leaf	1	43.00
12	49818 D	No. 3 leaf	1	49.00
13	49817 D	No. 2 leaf	1	49.00
14	49816 D	No. 1 leaf	1	3.00
15	8349 D	Guide pad	2	46.00
16	6890 D	Saddle, lower	1	85.00
17	6911 DB	Frame pad, lower	1	.50
...	Q 4120	Cap screw, 3/4 x 3-1/4" N.C.	5	.78
...	Q 4184	Cap screw, 1 x 2-1/2" N.C.	4	.04
...	Q 1927	Lock washer, 3/4"	5	.08
...	.....	Lock washer, 1"	4	20.00
18	9219 DX	Bumper pad bracket, L.H.	1	.62
...	Q 4149	Cap screw, 7/8 x 2-3/4" N.C.	4	.05
...	Q 1929	Lock washer, 7/8"	4	20.00
...	9220 DX	Equalizer spring bumper pad bracket, R.H.	1	.62
...	Q 4149	Cap screw, 7/8" N.C. x 2-3/4"	4	.05
...	Q 1929	Lock washer, 7/8"	4	2.00
...	61613 D	Equalizer spring bumper pad	2	

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

RIGID TRACK FRAME



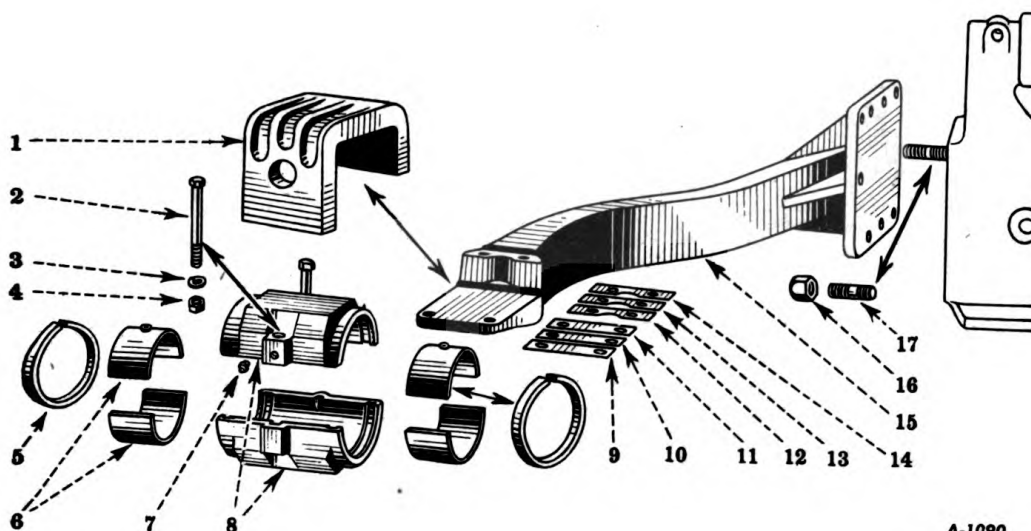
A-1067

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	8964 D	Rigid track frame cross bar clamp support	1	15.125
...	Q 1894	Cap screw, 3/4" N.C. x 2-1/2".	5	.408
...	Q 1927	Lock washer, 3/4".	5	.045
2	59550 D	Rigid track frame cross bar wedge bolt	2	1.500
...	.....	Washer, 1-3/32" I.D. x 1-1/2" O.D. x 9 gage.	2	
3	59551 D	Rigid track frame cross bar wedge bolt lock.	2	.094
4	59547 D	Rigid track frame cross bar bracket dowel	1	.500
5	8967 D	Rigid track frame cross bar bracket, left hand	1	19.000
	8968 D	Rigid track frame cross bar bracket, right hand.	1	19.000
6	8969 D	Rigid track frame cross bar wedge clamp	2	3.937
7	59549 D	Rigid track frame cross bar wedge.	2	19.000
8	62598 D	Rigid track frame cross bar, complete with angle brackets	1	436.000
9	59548 D	Rigid track frame bar bracket "U" bolt	2	4.375
10	59541 D	Rigid track frame cross bar dowel.	1	.312
11	8963 D	Rigid track frame cross bar clamp.	1	25.500
...	Q 1891	Cap screw, 3/4" N.F. x 2-1/4".	10	.400
...	Q 1927	Lock washer, 3/4".	10	.045
12	59544 D	Rigid track frame cross bar clamp shim, medium.	2	.047
13	59543 D	Rigid track frame cross bar clamp shim, heavy	2	.094
14	59542 D	Rigid track frame cross bar clamp shim, extra heavy	2	.187
15	8962 D	Rigid track frame drawbar pivot bracket	1	51.500
...	Q 4184	Cap screw, 1" N.C. x 2-1/2".	4	.781
...	.....	Lock washer, 1".	4	.087
16	41842 D	Rigid track frame cross bar bracket "U" bolt nut.	4	.266
...	Q 1929	Lock washer, 7/8".	4	.050
..	59545 D	Track spring guard, L.H.	1	
	59546 D	Track spring guard, R.H.	1	

SPARE PARTS CATALOG

TRACK FRAME DIAGONAL BRACE

If the tractor is equipped with a Rigid Track Frame (see page 8) the Track Frame Diagonal Brace is not used.



A-1090

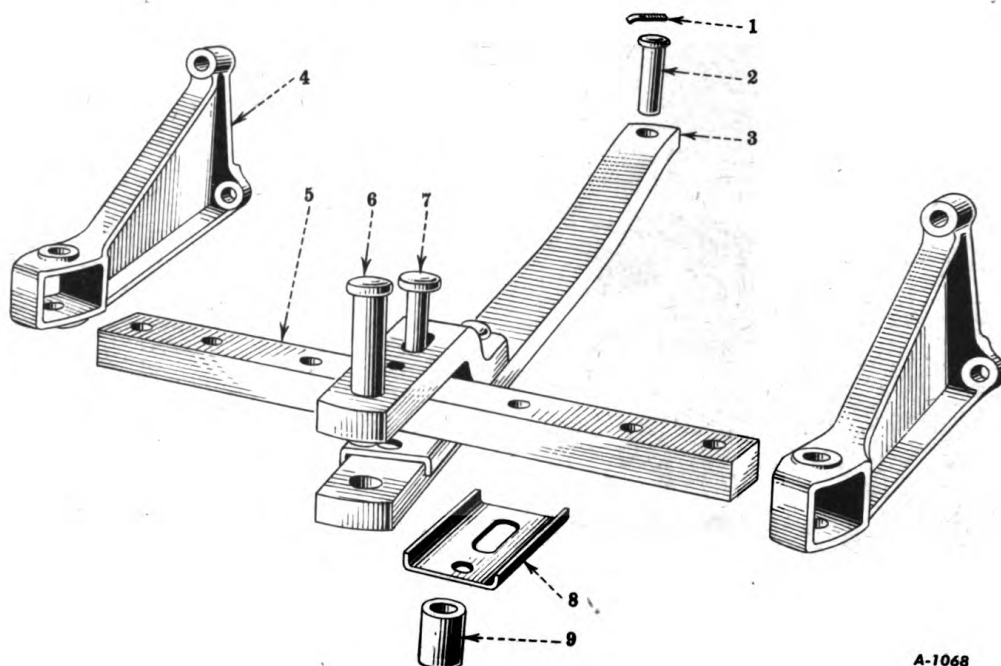
Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	6894 DA	Clamp	2	17.000
...	Q 1890	Cap screw, 3/4 x 2" N.C.	4	.333
...	Q 4125	Cap screw, 3/4 x 4-1/2" N.C.	4	.625
...	Q 1927	Lock washer, 3/4"	8	.045
2	Q 4052	Cap screw, 1/2 x 3-1/2" N.F.	4	.250
3	18868 D	Lock washer (Shakeproof No. 1124)	4	.003
4	Q 1909	Hex. nut, 1/2" N.F.	4	.037
5	49835 D	Felt.	4	.006
6	57240 D	Bushing (set of 2)	2	1.531
	Q 3615	Lubricator (Lincoln No. 5000) (optional)	2	.016
7	14186 DA	Lubricator (Alemite No. 1610) (optional)	2	.015
8	57236 D	Bearing, complete (set of 2)	2	14.125
9	49839 D	Shim, outer - heavy	2	.062
10	49840 D	Shim, outer - medium	2	.047
11	49841 D	Shim, outer - light	4	.016
12	49836 D	Shim, inner - heavy	2	.062
13	49837 D	Shim, inner - medium	2	.031
14	49838 D	Shim, inner - light	4	.016
15	52336 DA	Diagonal brace, left hand (74" tread)	1	137.000
	52337 DA	Diagonal brace, right hand (74" tread)	1	137.000
16	41842 D	Diagonal brace flange stud nut.	12	.265
...	Q 1929	Lock washer, 7/8"	12	.050
17	55338 D	Diagonal brace stud	12	.453

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

DRAWBAR AND BRACKETS



A-1068

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	47772 D	Lock.	1	.125
...	Q 1801	Cap screw, 3/8 x 1" N.F.	1	.050
...	Q 1920	Lock washer, 3/8"	1	.005
2	49983 D	Pivot pin	1	3.500
3	53973 D	Drawbar	1	143.000
...	.....	Round head steel rivets, 1-1/8 x 5"	2	1.875
4	6917 DA	Guide bracket	2	34.000
...	.....	Hex. nut, 7/8" N.F.	6	.156
...	Q 1929	Lock washer, 7/8"	6	.050
5	49984 D	Guide	1	70.000
...	.....	Cap screw, 1-1/8 x 5-1/4" N.F.	2	.687
...	.....	Hex. nut, 1-1/8" N.F.	2	.250
...	Q 1930	Lock washer, 1-1/8"	2	.070
6	49986 D	Clevis pin.	1	4.875
...	.....	Cotter, 3/8 x 2-3/4"	1	.125
7	49987 D	Stop pin.	1	2.500
...	.....	Cotter, 1/4 x 2-1/4"	1	.031
8	53977 D	Clevis wear plates.	2	2.500
...	.....	Cap screw, 1" N.F. x 7"	1	1.750
...	.....	Hex. nut, 1" N.F.	1	.281
...	.....	Lock washer, 1"	1	.087
9	53976 D	Spacer.	1	1.187

When ordering, always use I H C Part Nos.

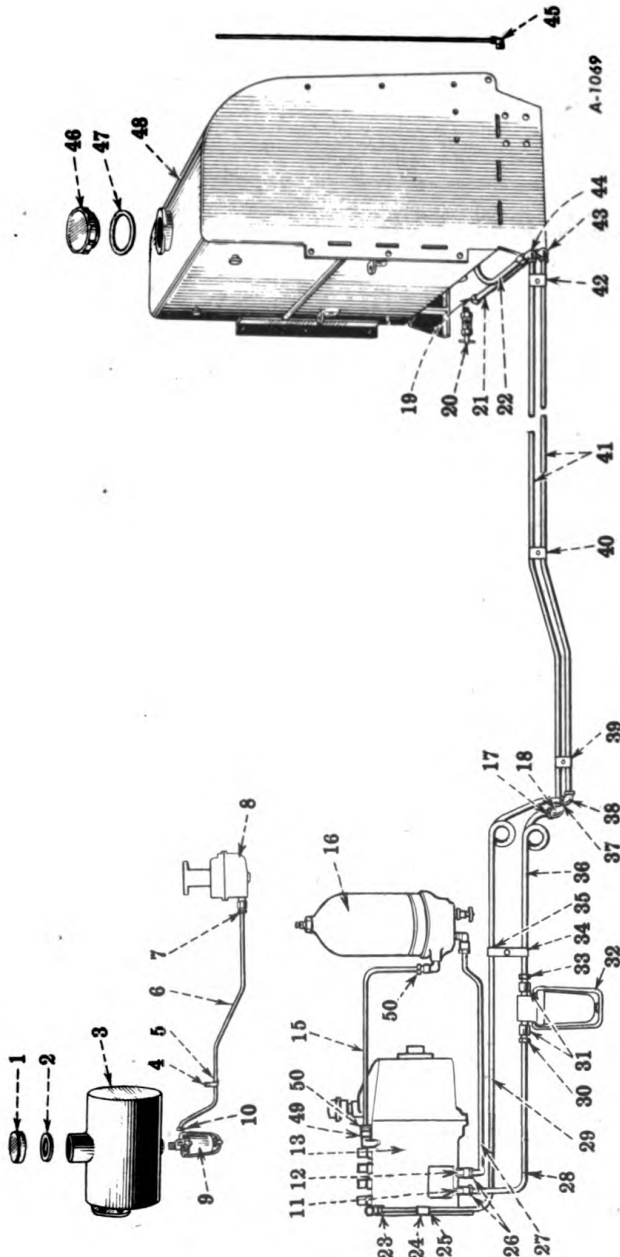
Don't order parts from the illustrations only; refer to the list also.

FUEL SYSTEM

	Page
Carburetor.	6,7
Fuel and gasoline tanks and piping.	2,3
Fuel supply pump.	11
Gasoline strainer assembly.	4
Governor.	16 to 19
Injection nozzle and pipes.	9
Injection pump and connections.	10
Primer and connections.	8
Pump unit	12 to 15
Water trap.	5

SPARE PARTS CATALOG

FUEL AND GASOLINE TANKS AND PIPINGS



Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	23995 D	Cap	1	.125	32	60870 D	Water trap.	1	.031
2	23977 DA	Cap gasket.	1	.009	33	37165 D	Coupling nut.	1	.002
3	41574 DCX	Gasoline tank with filler cap.	1	7.250	34	16445 D	Clamp felt.	1	.063
...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	4	.040	35	16518 D	Clamp	2	.063
...	Q 1920	Lock washer, 3/8".	4	.005	...	.....	Round head screw, No. 10 - 24 x 3/8"	1	.003
4	66360 D	Gasoline pipe clip.	1	.002	...	.....	Hex. nut, No. 10 - 24	1	.004
5	16445 D	Gasoline pipe clip felt	1	.002	...	.....	Lock washer, No. 10	1	.002
6	60014 DAX	Gasoline pipe, with coupling nut	1	.281	36	56148 DX	Fuel tube, with coupling nut	1	.313
7	29899 D	Gasoline pipe	1	.281	...	.....	...	...	...

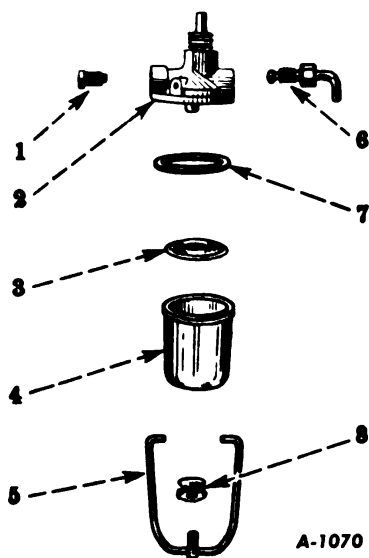
SPARE PARTS CATALOG

FUEL AND GASOLINE TANKS AND PIPINGS - Continued

8	.....	Carburetor (See detail list, page 1)	1		42406 DX	Fuel return pipe elbow with nut.	1	.093
9	.....	Gasoline strainer, with coupling nut (See detail list, page 4).	1		42406 D	Fuel return pipe elbow	1	.036
10	29899 D	Gasoline pipe coupling nut	1	.025	42385 D	Clamp	2	.015
11	{38026 DM	Connector	1		Q 1805	Cap screw, 3/8 x 1-1/2" N.F.	1	.005
12	{38026 DMX	Connector with nut.	1		Q 1905	Hex. nut, 3/8"	1	.093
13	{50607 D	Elbow	1		Q 1920	Lock washer, 3/8"	1	.036
14	{50607 DX	Elbow with nut.	1		42385 D	Clamp	1	.015
15	60023 DX13 1/2	Bosch fuel injection pump.	1		Q 1805	Cap screw, 3/8 x 1-1/2" N.F.	1	.005
16	60430 DX	Outlet pipe, with nut	1		Q 1905	Hex. nut, 3/8"	1	1.500
17	.....	Fuel filter	1	.031	Q 1920	N.F.	2	.093
18	37165 D	Elbow coupling nut.	1		50148 D	Lock washer, 3/8"	1	.036
19	42406 DX	Fuel pipe elbow, with nut.	1	.029	42385 D	Pipe	1	.015
20	42406 D	Fuel pipe elbow	1	.063	Q 1805	Clamp	1	.005
21	24855 D	Coupling nut.	2	.219	Q 1905	N.F. x 1-1/2"	1	.125
22	48231 D	Shut-off valve.	1	.375	Q 1920	Lock washer, 3/8"	1	.219
23	52389 D	Pipe.	1	.198	48233 D	Return pipe elbow	1	.313
24	48234 D	Pipe.	1	.031	48232 D	Pipe elbow	1	.500
25	37165 D	Coupling nut.	1		42384 DXA	Stand pipe, with elbow.	1	.012
26	38411 D	Fuel return tube clip	1	.002	42387 D	Cap	1	175.000
27	16445 D	Fuel return tube clip felt.	2	.031	42495 D	Cap gasket.	1	.105
28	37165 D	Elbow coupling nut.	2		50160 DBX	Fuel tank with cap.	1	.095
29	60145 DAX	Inlet pipe.	1	.500	Q 1850	Cap screw, 1/2 x 1-1/4" N.C.	2	.013
30	60143 DAX	Pipe.	1	.031	Q 1846	Cap screw, 1/2 x 3/4" N.C.	6	.063
31	56149 DX	Fuel return tube, with coupling nut.	1		Q 1922	Lock washer, 1/2"	8	.031
	37165 D	Elbow coupling nut.	1	.500	{50607 DX	Pipe plug, 1/2"	1	
	{38026 DMX	Dash to water trap connector with nut.	1	.031	{50607 D	Elbow and nut	1	
	38026 DM	Pipe connector.	2		37165 D	Elbow coupling nut.	2	

SPARE PARTS CATALOG

GASOLINE STRAINER ASSEMBLY

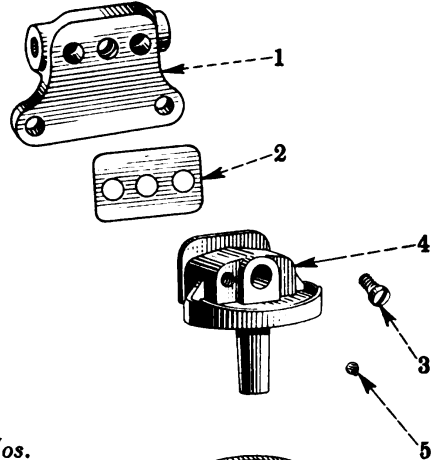


Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	51066 DBX	Gasoline strainer, with nut.	1	.690
1	29899 D	Coupling nut	1	.001
2	54486 D	Top or body.	1	.250
3	13194 D	Screen	1	.006
4	51344 V	Glass.	1	.250
5	17564 D	Bail or strap.	1	.060
6	52855 D	Valve.	1	.040
7	13193 D	Gasket	1	.092
8	17565 DA	Nut and cap.	1	.030

When ordering, always use I H C Part Nos.

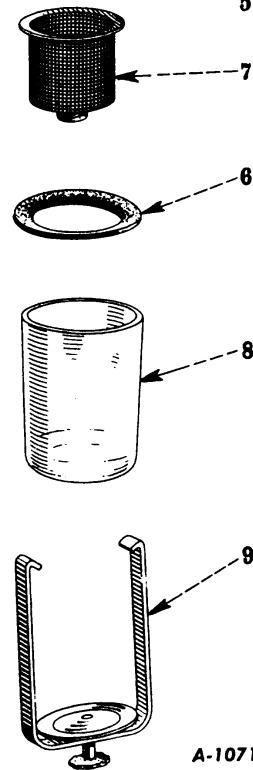
SPARE PARTS CATALOG

WATER TRAP



When ordering, always use I H C Part Nos.

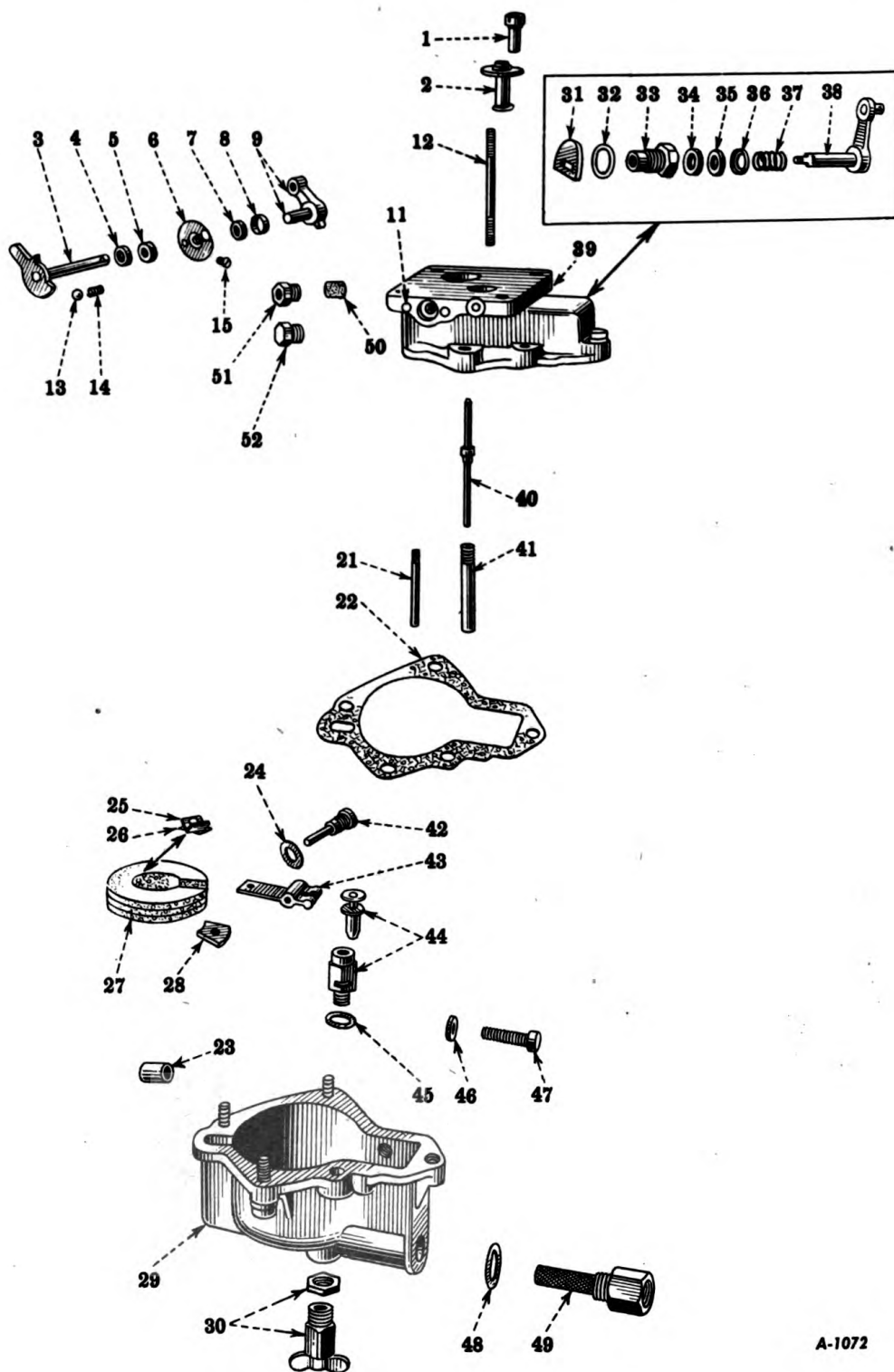
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	60870 D	Water trap	1	2.375
...	Q 1864	Cap screw, 1/2" N.C. x 3"	1	.200
...	Q 1922	Lock washer, 1/2"	1	.013
1	8221 D	Bracket	1	3.250
...	Q 1802	Cap screw, 3/8" N.C. x 1"	2	.045
...	Q 1920	Lock washer, 3/8"	2	.005
2	51527 D	Gasket	1	.008
3	60871 D	Vent screw	1	.020
4	9118 DX	Water trap top	1	1.188
...	Q 1864	Cap screw, 1/2" N.C. x 3"	1	
...	Q 1922	Lock washer, 1/2"	1	.013
5	24805 D	Water trap top plug	1	.001
6	60876 D	Water trap gasket	1	.006
7	60872 D	Water trap screen	1	.125
8	60877 D	Water trap glass	1	.718
9	60878 DX	Water trap bail	1	.375



A-1071

SPARE PARTS CATALOG

DIESEL DUAL MANIFOLD STARTING CARBURETOR



A-1072

Don't order parts from the illustrations only; refer to the list also.

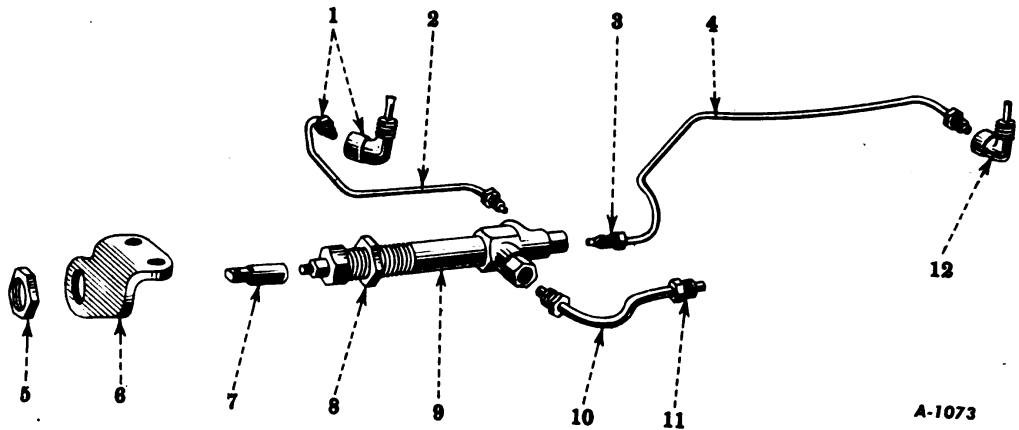
SPARE PARTS CATALOG

CARBURETOR - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	53458 DD	Carburetor (IHC)	1	4.000
...	Q 1903	Hex. nut, 5/16" N.F.	4	.031
...	Q 1919	Lock washer, 5/16"	4	.003
1	50807 D	Air valve collar	1	.047
2	56679 D	Air valve assembly	1	3.125
3	56537 DX	Shaft assembly, long, with lever and screw . .	1	.062
4	45148 D	Retainer	1	.001
5	45149 D	Dust seal.	1	.001
6	56542 DX	Starting shutter assembly.	1	.013
7	45149 D	Dust seal.	1	.001
8	45148 D	Retainer	1	.001
9	56538 DX	Shaft assembly, short, with lever and screw. .	1	.062
11	45110 D	Stop pin	2	.002
12	53840 D	Air valve guide.	1	.125
...	.....	Cadmium plated cotter, 1/16 x 3/4"	1	.001
13	46184 D	Friction spring ball	1	.005
14	46059 D	Friction spring.	1	.001
15	31636 D	Shutter screw.	2	.001
21	50803 D	Fuel inlet tube.	1	.045
22	32606 DA	Gasket	1	.003
23	32604 D	Float lever spacer	1	.003
24	59241 D	Gasket	1	.002
25	32578 D	Spring, upper leaf	1	.003
26	32577 D	Float lever spring, lower leaf	1	.002
27	32572 DAX	Cork float	1	.031
...	.....	Cadmium plated round head slotted screw, No. 4 - 36 x 7/16"	1	.002
28	32574 D	Reenforcing plate.	1	.012
29	{ 5051 DX	Fuel bowl (optional)	1	.719
	{ 9390 DX	Fuel bowl (optional)	1	
30	58840 DX	Drain valve assembly with lock nut	1	.063
31	32582 D	Cam.	1	.016
32	58836 D	Gasket	1	.003
33	32585 DA	Bearing.	1	.047
34	32588 D	Dust washer.	1	.000
35	32588 D	Dust washer.	1	.000
36	32587 D	Retainer	1	.063
37	32586 D	Spring	1	.032
38	50801 D	Shaft and lever assembly	1	.016
...	.....	Hex. nut, No. 8 - 32	1	.003
...	.....	Lock washer, No. 8	1	.002
39	8479 DBX	Body with stop pin, dust seal and retainer . .	1	2.000
40	53837 DX	Nozzle and tube.	1	.050
41	53836 D	Metering well.	1	.016
42	32576 DX	Float pivot screw.	1	.016
43	32575 D	Float lever.	1	.016
44	32581 DXA	Needle valve cage with gasket.	1	.125
45	25948 D	Gasket	1	.001
46	.....	Cadmium plated lock washer, (No. 12)	5	.001
47	.....	Cadmium plated fillister head machine screw (No. 12 - 24 x 7/8")	5	.006
48	18377 D	Gasket	1	.003
49	29902 DX	Screen retainer.	1	.047
50	27445 DB	Drip hole filler	1	.002
51	50802 D	Drip tube adapter.	1	.063
52	58835 D	Air valve control plug	1	.208
...	27452 D	Air valve spring	1	.003
...	35691 D	Fuel bowl assembly	1	.938
...	51704 D	Drain tube clip.	1	.021
...	53079 D	Float and lever assembly	1	.025
...	53459 DA	Carburetor gasket.	1	.063
...	58837 D	Drain valve lock nut	1	.016
...	58843 DX	Drain trough	1	.156
...	58859 DX	Drain tube and nut	1	.063
...	25038 HA	Drain tube nut	1	.010

SPARE PARTS CATALOG

PRIMER AND CONNECTIONS



A-1073

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

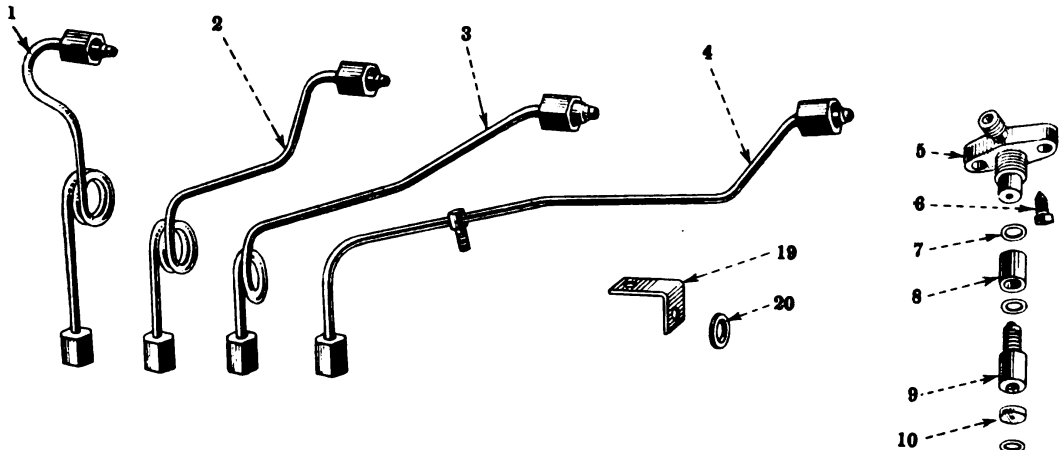
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50683 DX	Elbow and nut	2	.063
2	53387 DX	Pipe, rear, and nut	1	.063
3	36092 D	Nut	4	.012
4	53386 DX	Pipe, front, and nut.	1	.063
5	42215 D	Nut	1	.015
6	50682 D	Bracket	1	.125
...	Q 1774	Cap screw, 5/16" N.C. x 3/4".	2	.031
...	Q 1919	Lock washer, 5/16".	2	.003
7	42772 D	Control rod, end.	1	.125
8	42215 D	Nut	1	.015
9	{ 53136 D	Primer (optional)	1	
	{ 54692 DA	Primer (optional)	1	5.250
10	53388 DX	Inlet tube and nut.	1	.250
11	25038 HA	Inlet tube nut.	1	.019
12	50683 D	Elbow	2	.063

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

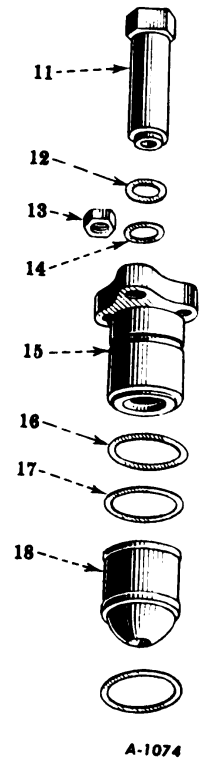
SPARE PARTS CATALOG

INJECTION NOZZLE AND PIPES



When ordering, always use I H C Part Nos.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	50620 D	Injection pipes.	1	1.188
...	52613 D	Injection nozzle (includes Ref. Nos. 5 thru 11). .	4	1.438
1	50621 DX	Pipe, with nuts (No. 1). .	1	.438
2	50622 DX	Pipe, with nuts (No. 2). .	1	.438
3	50623 DX	Pipe, with nuts (No. 3). .	1	.500
4	50624 DX	Pipe, with nuts (No. 4). .	1	.500
...	Q 1903	Hex. nut, 5/16" N.F. . .	1	.031
...	Q 1919	Lock washer, 5/16" . . .	1	.003
5	52612 D	Nozzle fitting	4	.625
6	32493 D	Bleeder valve.	4	.032
7	37148 D	Gasket	12	.020
8	37150 D	Spacer	4	.050
9	37152 D	Valve and spring assembly. .	4	.125
10	43192 DA	Injection plate.	4	.015
11	42766 D	Nozzle body.	4	.437
...	.....	Cap screw, 3/8" N.F. x 2". .	8	.080
12	61208 D	Nozzle body dust seal. . .	4	.010
13	31121 D	Stud nut	8	.063
14	42767 D	Gasket	4	.015
15	42765 DA	Retainer	4	2.250
16	61209 D	Nozzle body retainer dust seal.	4	.010
17	43002 D	Spacer gasket.	8	.063
18	56291 D	Spacer	4	.500
19	50626 D	Clip	1	.063
...	Q 1774	Cap screw, 5/16" N.C. x 3/4".	1	.031
...	Q 1919	Lock washer, 5/16" . . .	1	.003
20	27927 DA	Brace washer	1	.063

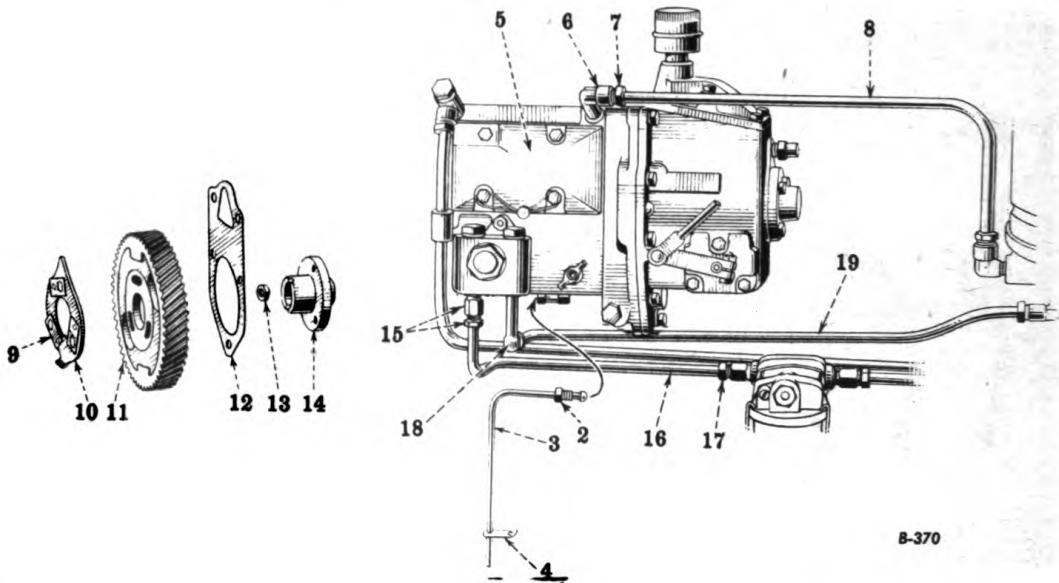


Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

INJECTION PUMP AND CONNECTIONS



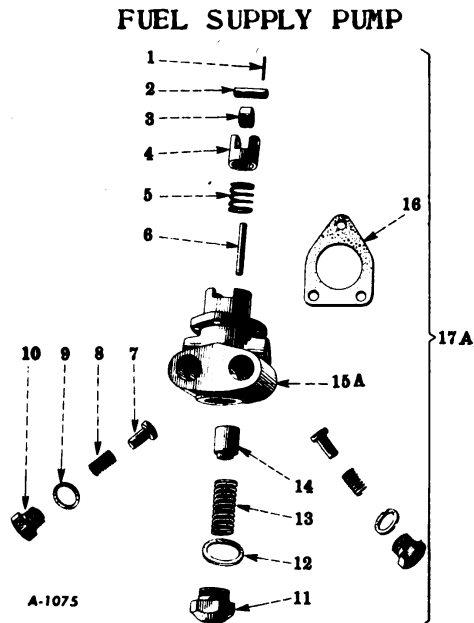
Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
2	29898 D	Overflow pipe elbow nut	1	.016
3	60144 DX	Injection pump overflow pipe, with nut	1	.125
4	52128 D	Clip.	1	.031
5	60023 DX13½	Fuel injection pump and gear hub (Bosch) (1350 R.P.M.)	1	44.000
...	...	Cap screw, 3/8" N.C. x 1-3/8"	1	.063
...	Q 1802	Cap screw, 3/8" N.C. x 1"	3	.063
...	Q 1820	Cap screw, 3/8" N.C. x 3"	1	.125
...	Q 1920	Lock washer, 3/8"	4	.007
6	50607 DX	Elbow and nut (on pump)	1	.063
7	37165 D	Nut	1	.031
8	60430 DX	Outlet pipe, with nut	3	.250
9	46250 D	Lock.	1	.063
10	46584 DX	Timing indicator, with lock	1	.500
11	50412 D	Pump gear	1	2.750
...	Q 1802	Cap screw, 3/8" N.C. x 1"	3	.015
12	46583 D	Gasket.	1	.010
13	54290 D	Hex. nut.	1	.032
14	8000 DA	Gear hub.	1	1.500
15	38026 DMX	Connector and nut (on pump)	1	.093
16	60143 DAX	Inlet pipe, with nut.	1	.032
17	37165 D	Nut	1	.032
18	50607 DX	Elbow and nut (on pump)	1	.156
19	60145 DAX	Pipe, with nut.	1	.250
...	30402 DX	Injection pump overflow pipe elbow with nut	1	.063
...	30402 D	Injection pump overflow pipe elbow	1	.047

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP



IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

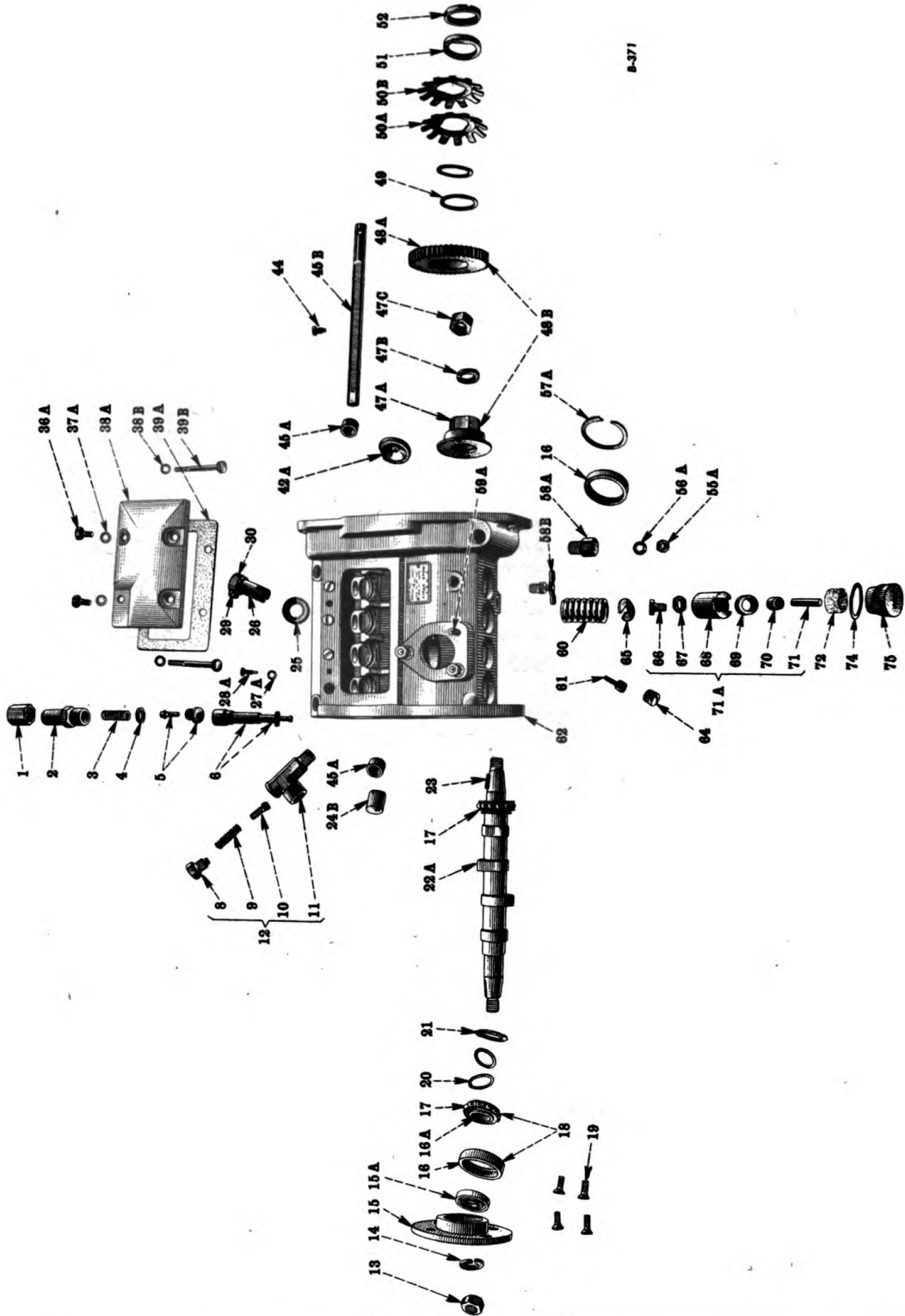
Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.
17A	62125 D	AFP/K16NK 522	Fuel supply pump, complete	1	
1	43189 D	PN 797	Tappet securing pin . .	1	
2	40388 D	WBO 2174/1X	Tappet wrist pin. . . .	1	.010
3	40390 D	WRL 2004/1X	Tappet roller	1	.020
4	40386 D	PVE 46/1X	Tappet shell.	1	.004
5	40395 D	WSF 2197A1X	Tappet spring	1	.005
* 6	54370 D	WBO 2140/2X	Spindle	1	.010
7	40385 D	PVE 45/1X	Valve, inlet and outlet	2	.003
8	54371 D	WSF 2196/4X	Valve spring.	2	.001
9	62129 D	WMR 2041/404X	Valve spring retainer screw gasket	1	
10	40397 D	WVU 2097/1X	Valve spring retainer screw.	2	.062
11	54367 D	SC 7919A	Plunger spring retainer screw with plug. . .	1	.125
12	61111 D	WMR 2041/2X	Plunger spring retainer screw gasket	1	.002
13	54366 D	WSF 2216A/1X	Plunger spring.	1	.018
* 14	54365 D	PKB 45/1X	Plunger	1	
15A	62126 DY	HG 7965A	Fuel supply pump housing (includes Ref.Nos. 6 and 14).	1	
...	.....	NT5-8CA	Hex nut, 1/4" N.C. . .	3	
...	.....	NSR1A1X	Pipe plug, 1/8"	1	
16	54364 DB	GA 76120	Fuel supply pump housing gasket	1	.002

* - Not for service, order 62126DY.

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

PUMP UNIT



SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

PUMP UNIT - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.
...	60023 DX13½	.....	Fuel injection pump, complete (See pages 11 thru 19.)	1	.050
...	Q 1802	.....	Cap screw, 3/8 x 1" N.C. hex. head.	2	
...	.....	.....	Cap screw, 3/8 x 1-3/8" N.C.		
...	Q 1820	.....	hex. head	1	.062
...	Q 1920	.....	Cap screw, 3/8 x 3" N.C. hex. head.	1	.120
...	61909 D	.....	Lock washer, 3/8"	4	
...		APE 4A 90P-320K 601	Pump unit, complete. (less Ref. Nos. 8 thru 12 and 47C thru 55)	1	
1	40255 D	WMU 9A 2X	Delivery valve holder protection cap	4	
2	54320 D	HP 7624	Delivery valve holder	4	
3	54329 D	SP 7617	Delivery valve spring	4	.007
4	55361 D	WNR 2021/3X	Delivery valve holder gasket	4	.002
5	54326 D	VA 7636A	Delivery valve and seat	4	.031
6	54337 D	BC 7641/2A	Plunger and barrel (9 mm. dia. x 14.89 mm. helix)	4	
8	54374 D	SC 7630	Valve screw	4	.037
9	40401 D	WSP 2177/1X	Valve spring	1	.001
10	40399 DA	PVE 48A 1X	Valve proper	1	.002
11	54373 DB	VA 7923	Valve body	1	.187
12	54372 DB	VA 7613A	Overflow valve, complete	1	.918
13	54290 D	WMU 511/2X	Camshaft hex. nut	1	.031
14	Q 1922	WA 5-16 CA	Lock washer, 1/2"	1	
15	54294 DAX	PL 7623A	End plate with oil seal, 54295 D	1	.918
15A	54295 D	PK 764	End plate oil seal	1	.012
16	64960 D	NIR-6/17 X	Camshaft bearing outer race	1	.062
16A	64959 D	NAR-6/17 X	Camshaft bearing inner race	2	.046
17	64961 D	NFR-6/17 Z	Camshaft bearing retainer with balls	2	.046
18	54293 D	NKL 6/17Z	Camshaft bearing, (N.D. No. 17H)	2	.125
19	40216 D	NSR 734/19X	End plate fastening screw	4	

(Continued on next page)

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

PUMP UNIT - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.
20	54296 D	WMS 101/11X	Bearing adjusting washer, o. 1M/M	As req'd	
	54297 D	WMS 101/27X	Bearing adjusting washer, o. 13M/M	As req'd	
	54298 D	WMS 101/25X	Bearing adjusting washer, o. 3M/M	As req'd	
21	56113 D	WMS 2215/1X	Camshaft oil thrower	1	.003
22A	61911 D	SH 7632	Camshaft	1	1.250
...	.....	WA5-16CA	Lock washer, 1/2"	1	.012
23	54291 D	NKE 5/1X	Camshaft key (Woodruff)	1	.003
24B	61965 D	CV 76108	Control rod protection cover	1	.012
25	54334 D	PMS 7/2X	Plunger spring seat, upper	4	.012
26	54330 D	PMB 3/2X	Control sleeve	4	.041
27A	62123 D	GA 7615	Barrel set screw gasket	4	
28A	61969 D	SC 7660	Barrel set screw	4	.007
29	54332 D	WSR 2100/2X	Toothed segment clamping screw	4	.002
30	54331 D	PZR 44/1X	Toothed segment	4	.015
36A	62120 D	SC 1119-1	Inspection cover fastening screw	2	
37A	40753 D	WA 22-8CA	Inspection cover fastening screw lock washer (Shakeproof No. 1214)	2	
38A	62115 D	CV 76109	Inspection cover	1	1.062
38B	67870 D	GA 7616	Inspection cover fastening screw	2	
39A	62118 D	GA 76111	long gasket	2	.002
39B	62121 D	SC 7661	Inspection cover gasket	1	.012
42A	61959 DX	BA 791	Inspection cover fastening screw, long	2	.031
44	54306 D	WSR 2125/1X	Pump housing baffle with button	1	.015
45A	54299 D	BG 763	Control rod securing screw	1	.020
45B	61963 D	RD 7689	Control rod bushing	2	.250
47A	62194 D	HB 796	Control rod	1	.437
47B	Q 1922	WA5-16CA	Drive gear hub	1	
47C	62199 D	NT 7921	Lock washer, 1/2" (cadmium plated)	1	.046
48A	62195 D	GE 7919	Drive gear hub nut	1	.562
48B	62193 D	GE 7918A	Drive gear	1	1.000
	54411 D	SR 794/1	Drive gear, complete	1	.004
	54412 D	SR 794/2	Adjusting spacer, .035"	As req'd	.007
	54413 D	SR 794/3	Adjusting spacer, .049"	As req'd	.009
49	62622 D	SR 794/4	Adjusting spacer, .065"	As req'd	.004
			Adjusting spacer, .020"	As req'd	

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

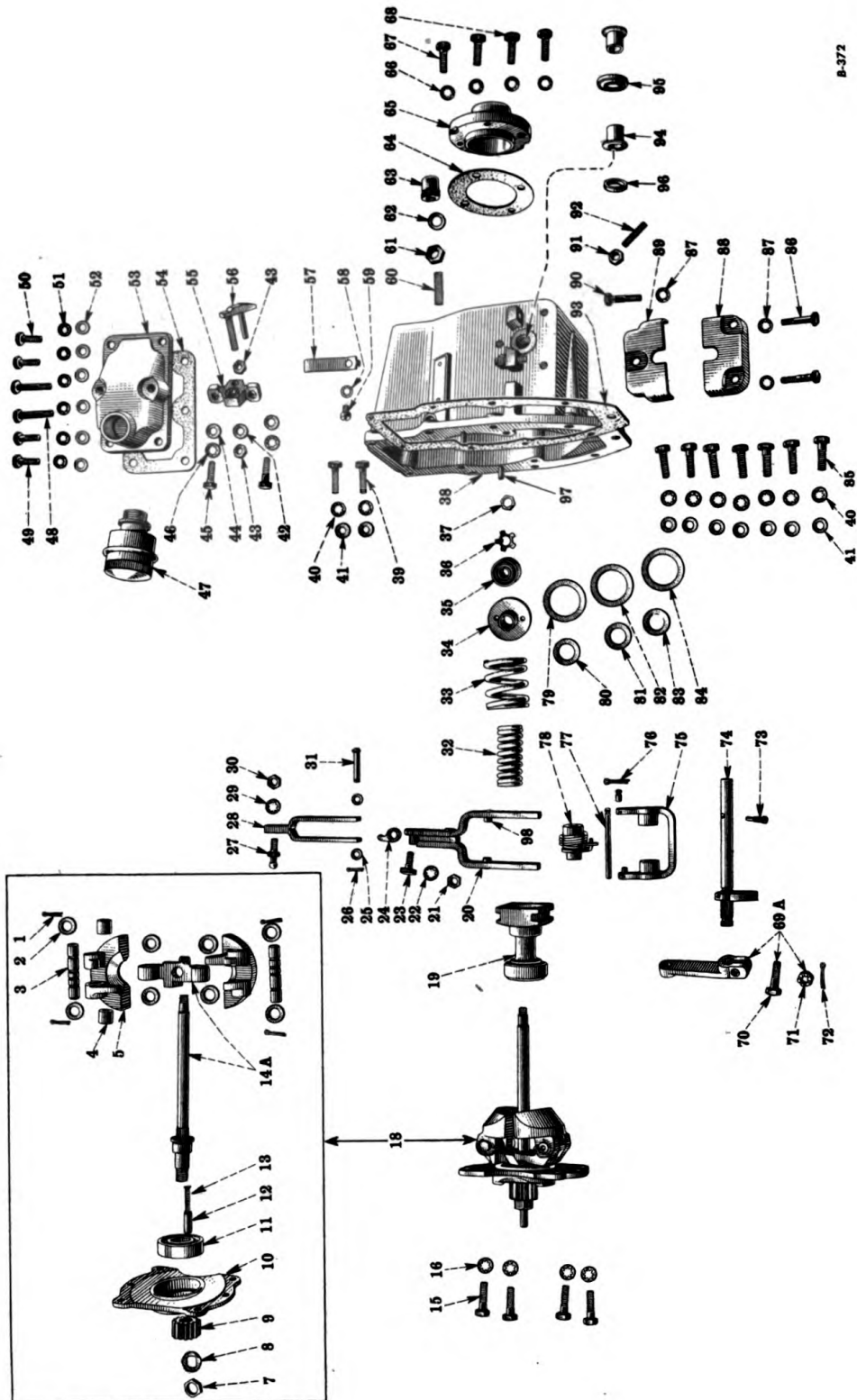
PUMP UNIT - Continued

50A	62196 D	DC 792	Drive gear spring disc, inner.	1	.020
50B	62197 D	DC 795	Drive gear spring disc, outer.	1	.020
51	62198 D	WA 7918	Drive gear adjusting nut lock washer	1	.007
52	54416 D	NT 795	Gear adjusting nut	1	.031
55A	Q 1902	NT5-8CA	Hex. nut, 1/4" N.C.	3	.007
56A	40753 D	WA 22-8CA	Fuel supply pump housing lock washer (Shakeproof No. 1214)	3	
57A	61917 D	RG 767	Bearing retainer ring.	1	.007
58A	61958 D	PG 7617	Lubricating oil drain plug	1	.073
58B	59708 D	FL 765	Lubricating oil level cock	1	
59A	61956 D	SD 7610	Fuel supply pump stud.	3	.008
60	54333 DA	WSF 2205A 400X	Plunger spring	4	.062
61	57503 DX	FL 7625A	Lubricating oil overflow tube with plug.	1	.009
62	61918 DX	HG 76185 A	Pump housing, complete	1	14.000
64	.....	NSR 1A 2X	Pipe plug, 1/4" slotted head (cadmium plated)	1	
65	54335 D	PMS 6/LX	Plunger spring seat, lower	1	.012
66	54346 D	PSR 3/LX	Tappet screw	4	.015
67	54347 D	WMV 2066/2X	Tappet screw lock nut.	4	.007
68	54348 DAX	PBK 41/LX	Tappet shell with insert	4	.125
69	54351 D	PRL 1/3X	Tappet roller.	4	.017
70	54350 D	PMB 4/LX	Tappet roller bushing.	4	.008
71	54349 D	PBO 1/LX	Tappet pin	4	.015
71A	54345 D	PKB 41/LZ	Tappet, complete	4	.187
72	54481 D	PPT 22/2X	Felt cushion	4	.002
74	61970 D	WMR 2041/405X	Closing plug gasket.	4	.002
75	62124 D	PG 7614	Closing plug	4	.093
...	61957 D	PG 7625	Fuel line closing plug (order 3/8" standard pipe plug)	2	.050
...	61962 D	NSR 1A 2X	Lubricating oil overflow plug, outer	1	.020

IMPORTANT: Be sure to give all information shown on Pump
Name Plate when ordering parts.

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued GOVERNOR



8-372

Bosch Injection Pump Governor

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

GOVERNOR - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.							
Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.		
...	62191 D	GVA 225/ 675PK-203	Governor, complete	1	13.500		
1	.....	PN2-14CA	Cotter pin, 1/16 x 5/8" (cadmium plated)	4	.002		
2	62220 D	WA 1134	Governor weight washer	8	.052		
3	62219 D	PN 7950	Governor weight pin	2	.015		
4	62218 D	BG 7918	Governor weight bushing	4	1.125		
5	62217 DX	WT 7926A	Governor weight (pairs) (includes Ref. No. 4)	1	.008		
7	62224 D	NT 7923	Governor driven gear nut	1	.001		
8	62223 D	WA 7919	Governor driven gear	1	.062		
9	62222 D	GE 7920	Governor support plate with cage	1	.625		
10	62225 DX	PL 7940	Bearing support shaft bearing (drive end) (N.D.3202 B)	1	.187		
11	62221 D	BB 7911	Governor weight shaft plunger oiler	1	.004		
12	62227 D	PC 799	Governor shaft plunger oiler spring	1	.002		
13	62228 D	SP 7954	Governor weight shaft, with spider and pins	1	.312		
14A	62214 D	SH 7928A	Governor weight shaft, with spider and pins	4	.007		
15	.....	PN 2-14CA	Cotter pin, 1/4 x 7/16" (cadmium plated)	4	.017		
16	62205 D	SC 1110-1	Bearing support plate bolt	4	2.312		
18	40753 D	WA 22-8CA	Bearing support plate bolt lock washer (Shakeproof No. 1214)	1	.500		
19	62229 DX	SV 7910A	Governor weight and shaft, complete (includes Ref. Nos. 1 thru 11 and 14A)	1	.250		
20	62237 DX	.....	Sleeve with bushing and thrust bearing	1	.007		
	62236 D	LE 7946A	Fulcrum lever (includes Ref. No. 98)	1	.020		
			Fulcrum lever (includes Ref. Nos. 20, 21, 22, 25 thru 31, 75, 76 and 77)	1	.008		
21	.....	RL-6-22	Rivet, 3/16" x 11/16", flat head	1	.020		
23	62271 D	NT8-8CA	Hex. jam nut, 1/4" N.F. (cadmium plated)	1	.125		
24	62270 D	CA 793	Smoke limit cam screw (fulcrum lever)	1	.007		
25	62249 D	WA 1156	Smoke limit cam	1	.008		
26	.....	PN 2-14CA	Control rod link pin washer	2	.020		
27	62247 D	PN 7935	Cotter pin, 1/16 x 7/8" (cadmium plated)	2	.125		
28	62246 DX	LK 796	Control rod linkage pin	1	.007		
29	40753 D	WA 22-8CA	Control rod linkage pin lock washer (Shakeproof No. 1214)	1	.007		
30	.....	NT 4-8CA	Hex. nut, 1/4" N.F. (cadmium plated)	1			

(Continued on next page.)

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

GOVERNOR - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.					
Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.
31	62248 D	PN 7946	Control rod link pin	1	.020
32	62648 D	SP 7950/2	Governor spring, inner	1	.062
33	62645 D	SP 7951/1	Governor spring, outer	1	.093
34	62628 D	GU 7912	Spring seat.	1	.062
35	62625 D	BB 7912	Governor weight shaft bearing (spring end) (N.D. 87008)	1	.062
36	62626 D	WA 1182	Governor weight shaft bearing lock washer.	1	.001
37	62627 D	NT 1070	Governor weight shaft bearing nut.	1	.006
38	62200 D	CV 7961A	Governor end cover (includes Ref. Nos. 57, 58 and 94 thru 97)	1	2.500
39	62204 D	SC 1110	Governor end cover bolt (drilled)	2	.015
40	40753 D	WA 22-8CA	Governor end cover bolt lock washer (Shakeproof No. 1214)	9	
41	62206 D	WA 1143	Governor end cover bolt washer	9	
42	55428 DA	WA 1155	Stop plate screw washer.	3	.002
43	.....	NT 8-8CA	Hex. jam nut, 1/4" N.F. (cadmium plated)	2	.007
44	62206 D	WA 1143	Stop plate bridge bolt washer.	2	.001
45	62205 D	SC 1110-1	Stop plate bridge bolt	2	.017
46	40753 D	WA 22-8CA	Stop plate bridge bolt lock washer (Shakeproof No. 1214)	2	
47	60740 D	CV 76126A	Breather, complete	1	.312
48	62275 D	SC 1139	Governor inspection cover bolt, center	2	.025
49	62276 D	SC 1140-1	Governor inspection cover bolt (drilled)	2	.014
50	62633 D	SC 1140	Governor inspection cover bolt, short.	2	.015
51	40753 D	WA 22-8CA	Governor inspection cover bolt lock washer (Shakeproof No. 1214)	6	
52	62206 D	WA 1143	Governor inspection cover bolt washer.	6	.001
53	62272 DX	CV 7982A	Governor inspection cover with baffle.	1	.375
54	62274 D	GA 7979	Governor end cover gasket.	1	.006
55	{ 62267 D	BK-7917	Stop plate bridge.	1	
	DX PL 7943A		Stop plate bridge (includes Ref. Nos. 42, 43, 56)	1	.093
56	62268 DX	PL 7942A	Stop plate with pin and screw	1	.010
57	62208 D	SP 7953	Bumper spring.	1	.003
58	67980 H	WA 22-6CA	Bumper spring lock washer (Shakeproof No. 1212)	3	
59	.....	.....	Screw, No. 12 - 24 x 5/16" fillister head (cadmium plated)	1	.005
60	62209 D	SC 1134	Bumper spring adjusting screw.	1	.018
61	.....	NT6-10CA	Hex. nut, 5/16" N.F. (cadmium plated)	1	.010
62	62211 D	GA 7980	Bumper spring cap gasket	2	.001

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

GOVERNOR - Continued

63	62210 D	NT 7917	Bumper spring cap.	1	.031
64	62235 D	GA 7982	Spring retainer end cap gasket	1	.003
65	62233 D	CP 7910	Spring retainer end cap.	1	.500
66	40753 D	WA 22-8CA	Spring retainer end cap bolt lock washer (Shakeproof No. 1214)	4	
67	62204 D	SC 1110	Spring retainer end cap bolt, upper.	2	.015
68	62205 D	SC 1110-1	Spring retainer end cap bolt, lower.	2	.018
69A	62263 DX	LE 7957A	Operating lever with bolt and nut	1	
70	62264 D	SC 7961	Operating lever bolt	1	.018
71	62265 D	NT 7919	Operating lever bolt nut	1	.004
72	.....	PN 2-20CA	Cotter pin, 1/16 x 5/8".	1	
73	54462 D	SC 7930	Spring plate set screw	1	.003
74	62255 DX	SH 7921A	Operating lever shaft with stop and pin.	1	.218
75	62243 DX	BK 7913A	Fulcrum lever bracket with bearings.	1	.093
76	.....	PN 2-20CA	Cotter pin, 1/16 x 5/8".	1	
77	64161 D	PN 7951	Fulcrum lever bracket pin	1	.006
78	62250 DX	PL 7923A	Spring plate (less spring)	1	
	62253 D	SP 7949	Operating lever spring	1	
	62259 D	PL 7925A	Operating shaft plate with hub and spring.	1	
79	62641 D	SR 7914/1	Outer spring spacer, .020"	As req'd	.004
80	62637 D	SR 799/1	Inner spring spacer, .020"	As req'd	.002
81	62638 D	SR 799/2	Inner spring spacer, .042"	As req'd	.005
82	62642 D	SR 7914/2	Outer spring spacer, .042"	As req'd	.010
83	62639 D	SR 799/3	Inner spring, .058"	As req'd	.005
	62640 D	SR 799/4	Inner spring spacer, .083"	As req'd	.008
	62643 D	SR 7914/3	Outer spring spacer, .058"	As req'd	.012
84	62644 D	SR 7914/4	Outer spring spacer, .083"	As req'd	.018
85	62205 D	SC 1110-1	Governor end cover bolt, long (plain).	7	.018
86	62262 D	SC 7950-1	Operating lever stop cover lower bolt.	2	.014
87	67980 H	WA 22-6CA	Operating lever stop cover lock washer(Shakeproof No. 1212)	3	
88	62261 D	CV 7946	Operating lever stop cover, lower.	1	.052
89	62254 D	CV 7945	Operating lever stop cover, upper.	1	.046
90	62260 D	SC 7950	Operating lever stop cover upper bolt.	1	.013
91	Q 1902	NT 6-8CA	Hex. nut, 1/4" N.F. (cadmium plated)	2	.007
92	.....	SC 350-16CA	Set screw, 1/4 x 1" headless (oval point) (cadmium plated)	2	
93	62203 D	GA 7978	Governor end cover gasket.	1	.008
94	54435 D	BG 793	Operating lever shaft bushing.	2	.012

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

SPARE PARTS CATALOG

DETAIL PARTS OF BOSCH INJECTION PUMP - Continued

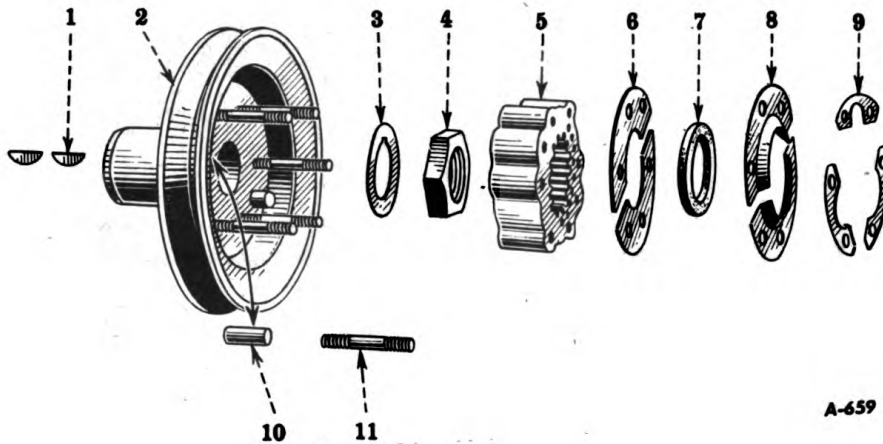
GOVERNOR - Continued

IMPORTANT: Be sure to give all information shown on Pump Name Plate when ordering parts.

Ref. No.	I H C Part No.	Bosch Part No.	Description	No. Used	Wt. Lbs.
95	54434 D	PK 795	Operating lever shaft oil seal	1	.008
...	40329 DA	SC 150-2CA	Name plate drive rivet	2	
...	62207 D	PN 751	Bearing support plate dowel pin.	2	
96	54441 D	PG 797	Plug (for operating lever shaft hole).	1	
97	62207 D	PN 751	Bearing support plate dowel.	2	
98	62242 D	PN 7931	Fulcrum lever pivot pin.	2	

SPARE PARTS CATALOG

FRONT POWER TAKE-OFF COUPLING



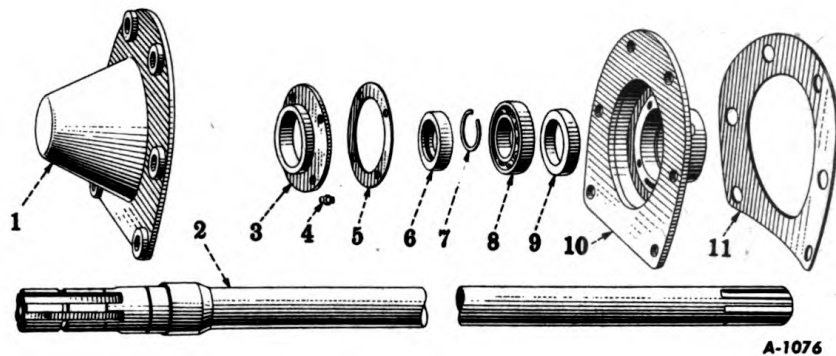
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Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	47487 D	Key (No. 23 Woodruff)	2	.050
2	8120 DAX	Pulley with drive pins.	1	13.625
3	4254 DA	Nut lock.	1	
4	4253 D	Nut (regular pulley nut).	1	
5	8119 D	Coupling (14 teeth)	1	3.375
6	51268 D	Shaft retainer.	2	.015
7	51269 D	Felt washer	1	.004
8	51271 D	Felt retainer	2	.125
9	47244 D	Lock.	3	.047
10	47490 D	Pin	2	.080
11	57715 D	Stud.	2	.004
...	Q 1905	Hex. nut, 3/8" N.F., type B	6	.001

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

REAR POWER TAKE-OFF ATTACHMENT (50908 D)



When ordering, always use I H C Part Nos.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	6277 D	Cover	1	9.750
...	Q 1890	Cap screw, 3/4" N.C. x 2"	6	.333
...	Q 1927	Lock washer, 3/4"	6	.045
2	50905 DAX	Power shaft	1	23.000
3	6276 DX	Retainer with seal.	1	1.375
...	Q 4017	Cap screw, 3/8" N.C. x 7/8"	4	.047
...	Q 1920	Lock washer, 3/8"	4	.005
4	Q 3615	Lubricator.	1	.016
5	45620 D	Gasket.	1	.005
6	45619 D	Oil seal, outer	1	.500
7	45537 D	Snap ring	1	.012
8	{ ST 202	Bearing (IHC) (optional).	1	1.000
	{ 18507 D	Bearing (N.D. No. 3209) (optional).	1	1.000
9	45561 D	Oil seal, inner	1	.250
10	6268 DX	Cage with seal.	1	10.250
11	42289 D	Gasket.	1	.062

Don't order parts from the illustrations only; refer to the list also.

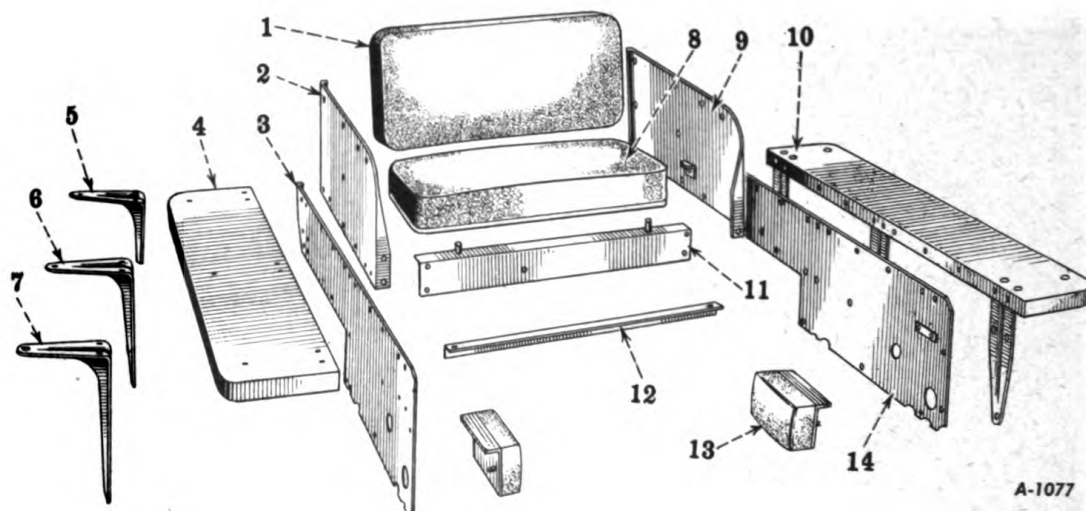
SPARE PARTS CATALOG

SEAT AND FENDERS

1

SPARE PARTS CATALOG

SEAT AND FENDERS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50524 D	Cushion back.	1	
...	Q 1800	Cap screw, 3/8" N.C. x 3/4"	2	
...	Q 1920	Lock washer, 3/8"	2	
2	50519 DX	Side sheet, right hand (seat)	1	
...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	2	
...	Q 4020	Cap screw, 3/8 x 5/8" N.F.	2	
...	Q 1905	Hex. nut, 3/8" N.F.	2	
...	Q 1920	Lock washer, 3/8"	4	
3	50512 DX	Side sheet, right hand (fender)	1	
...	Q 1798	Cap screw, 3/8 x 1/2" N.C.	2	
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	4	
...	Q 1905	Hex. nut, 3/8" N.F.	4	
...	Q 1920	Lock washer, 3/8"	6	
...	.....	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage.	6	
4	50517 D	Fender, right hand.	1	26.000
...	.....	Carriage bolt, 3/8 x 5/8" N.C.	9	.047
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	5	.040
...	Q 1906	Hex. nut, 3/8" N.C.	9	.031
...	Q 1905	Hex. nut, 3/8" N.F.	5	.016
...	Q 1920	Lock washer, 3/8"	15	.005
...	Q 1800	Cap screw, 3/8" N.C. x 3/4"	1	.035
...	.....	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage.	6	.016
5	50515 D	Fender bracket, rear.	1	2.250
...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	4	.035
...	Q 1847	Cap screw, 1/2 x 1" N.F.	8	.100
...	Q 1909	Hex. nut, 1/2" N.F.	8	.035
...	Q 1920	Lock washer, 3/8"	4	.005
...	Q 1922	Lock washer, 1/2"	8	.013

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Don't order parts from the illustrations only; refer to the list also.

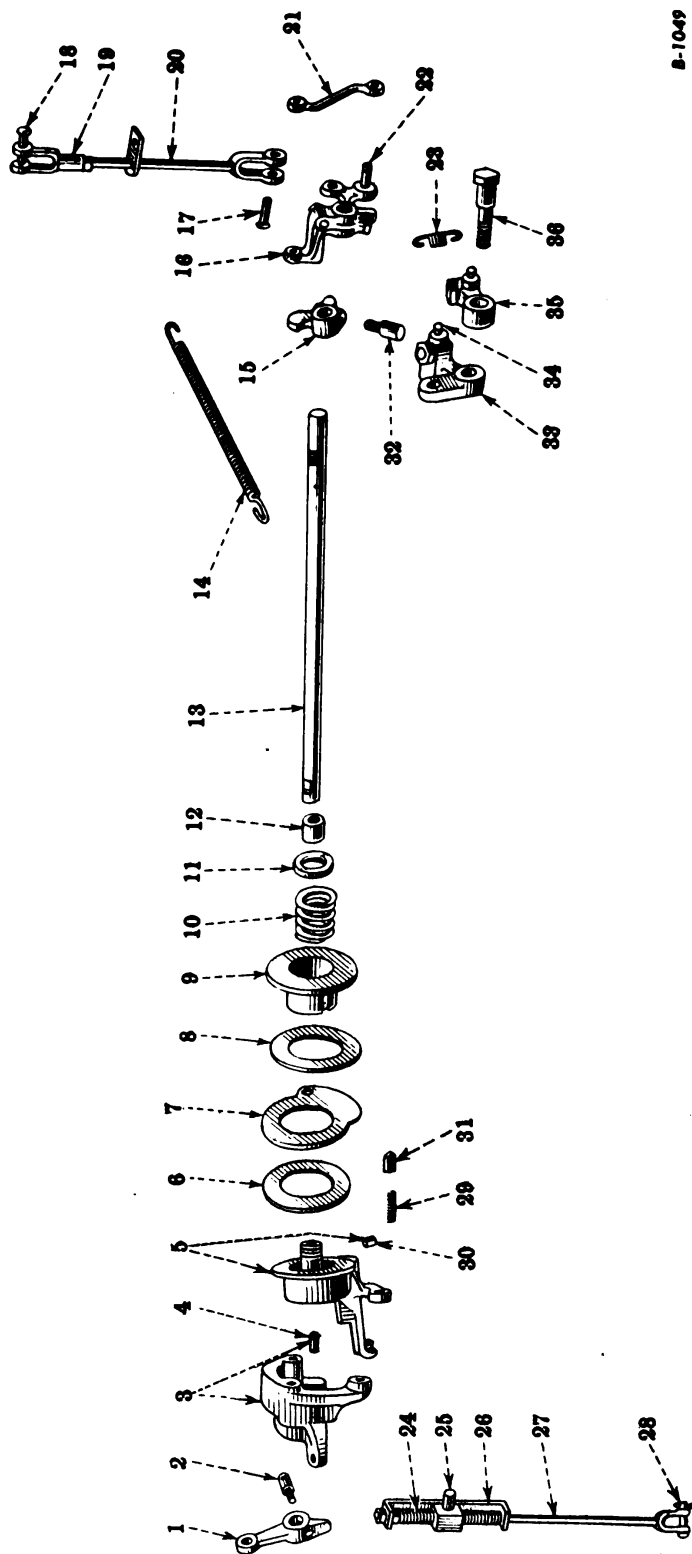
SPARE PARTS CATALOG

SEAT AND FENDERS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
6	50514 D	Bracket, center	1	3.000
...	Q 1847	Cap screw, 1/2" N.F. x 1"	4	.051
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	4	.040
...	Q 1845	Cap screw, 1/2 x 3/4" N.F.	2	.085
...	Q 1905	Hex. nut, 3/8" N.F.	4	.016
...	Q 1909	Hex. nut, 1/2" N.F.	4	.035
...	Q 1920	Lock washer, 3/8"	4	.005
...	Q 1922	Lock washer, 1/2"	6	.013
7	50513 D	Bracket, front.	1	3.125
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	4	.040
...	Q 1846	Cap screw, 1/2 x 3/4" N.C.	2	.085
...	Q 1853	Cap screw, 1/2 x 1-3/4" N.F.	4	.125
...	Q 1905	Hex. nut, 3/8" N.F.	4	.016
...	Q 1920	Lock washer, 3/8"	4	.005
...	Q 1922	Lock washer, 1/2"	6	.013
...	Q 1909	Hex. nut, 1/2" N.F.	4	.035
8	50525 D	Cushion bottom.	1	20.328
9	50518 DX	Side sheet, left hand (seat).	1	17.500
...	Q 4020	Cap screw, 3/8" N.F. x 5/8"	2	.040
...	Q 1905	Hex. nut, 3/8" N.F.	2	.016
...	Q 1920	Lock washer, 3/8"	4	.005
...	Q 4016	Cap screw, 3/8 x 5/8" N.C.	2	.039
10	50516 D	Fender, left hand	1	30.000
...	.....	Carriage bolt, 3/8 x 5/8" N.C.	9	.047
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	5	.040
...	Q 1906	Hex. nut, 3/8" N.C.	9	.031
...	Q 1905	Hex. nut, 3/8" N.F.	5	.016
...	Q 1920	Lock washer, 3/8"	15	.005
...	Q 1800	Cap screw, 3/8" N.C. x 3/4"	1	.035
...	.....	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage.	6	.016
11	50520 DX	Seat support, front	1	7.500
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	4	.040
...	Q 1905	Hex. nut, 3/8" N.F.	4	.016
...	Q 1920	Lock washer, 3/8"	4	.005
12	50521 D	Seat support angle, rear.	1	3.687
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	2	.040
...	Q 1905	Hex. nut, 3/8" N.F.	2	.016
...	Q 1920	Lock washer, 3/8"	2	.005
13	52390 D	Seat cushion side	1	2.500
...	Q 1904	Hex. nut, 5/16" N.C.	4	.030
...	Q 1919	Lock washer, 5/16"	4	.003
...	.....	Carriage bolt, 5/16 x 5/8" N.C.	2	.031
14	50511 DX	Side sheet, left hand (fender).	1	13.000
...	Q 1798	Cap screw, 3/8 x 1/2" N.C.	2	.035
...	Q 1799	Cap screw, 3/8 x 3/4" N.F.	4	.040
...	Q 1905	Hex. nut, 3/8" N.F.	4	.016
...	Q 1920	Lock washer, 3/8"	6	.005
...	.....	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage.	6	.016
			6	.016

SPARE PARTS CATALOG

CROSS SHAFT AND GOVERNOR CONTROL



8-1049

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

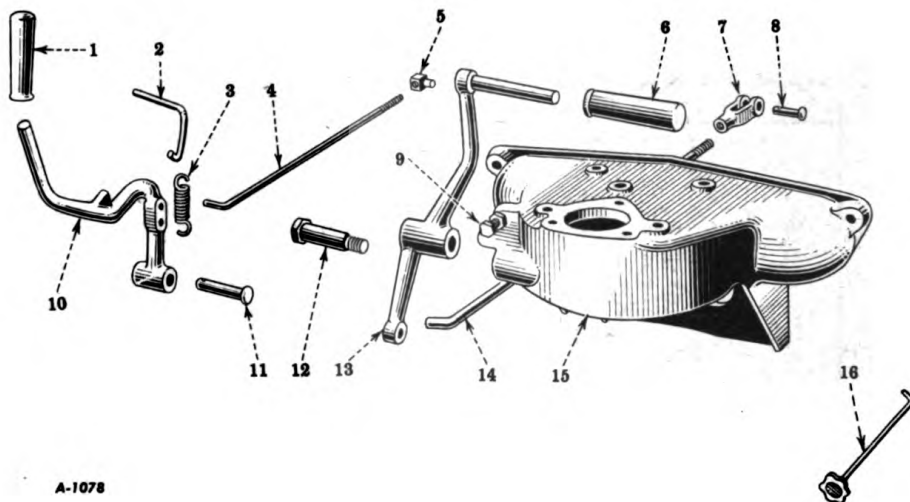
SPARE PARTS CATALOG

CROSS SHAFT AND GOVERNOR CONTROL - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	54086 D	Operating lever.	1		17	19306 D	Pin.	1	.031
2	20586 D	Pin.	1		18	19306 D	Cotter, 3/32 x 5/8"	1	.001
...	Q 1903	Hex. nut, 5/16" N.F.	1	.008	19	19305 D	Pin.	1	.031
...	Q 1919	Lock washer, 5/16"	1	.004	20	53416 D	Cotter, 3/32 x 5/8"	1	.001
3	9446 DAX	Cross shaft bracket.	1		21	53414 DX	Adjusting yoke	1	
...	Q 1814	Cap screw, 3/8" N.C. x 2-1/2"	2		22	53411 D	Operating rod.	1	.008
...	...	Cap screw, 3/8" N.C. x 1-3/8"	1		23	52624 D	Hex nut, 5/16" N.F.	1	
...	Q 1920	Lock washer, 3/8"	3		24	54125 D	Carburetor control link.	1	
...	...	Oval point headless set screw, 5/16" N.C. x 1-1/4"	1		25	42981 DA	Washer, 9/32" I.D. x 5/8" x No. 18 gage,	1	.001
...	...	Hex. jam nut, 5/16" N.C.	1		...	...	Cotter, 1/16 x 7/16"	2	
4	45391 D	Friction plate locating pin	1		26	54124 D	Jaw pin.	1	.006
5	9447 DX	Governor control lever, with dowel pin.	1	.875	27	53415 DX	Spring	1	.001
6	48356 D	Friction disc.	1		28	19306 D	Trunnion	1	.008
7	64543 D	Governor control friction plate	1		29	64545 D	Washer, 13/32" I.D. x 3/4" O.D. x No. 16 gage	1	
8	48356 D	Friction disc.	1		30	25115 D	Cotter, 3/32 x 5/8"	1	.031
9	6649 D	Disc retainer.	1		31	64544 D	Pin.	1	.001
10	48358 D	Spring	1		32	20586 D	Cotter, 3/32 x 5/8"	1	
11	48359 D	Spring nut	1		33	Q 1903	Low idle poppet spring	1	.008
12	50827 D	Bushing	2		...	Q 1919	Dowel pin.	1	.003
13	53417 D	Cross shaft.	1		...	8617 DX	Low idle poppet.	1	
14	52176 DC	Return spring.	1		...	...	Pin.	1	.008
15	52626 D	Jaw lever.	1		...	...	Hex. nut, 5/16" N.F.	1	
16	53410 DX	Jaw, with pin.	1		...	...	Lock washer, 5/16"	1	.003
...	...	Flat point headless set screw, 5/16" N.C. x 1-1/4"	1		...	...	Latch bracket, with spring pin	1	
...	...	Hex. jam nut, 5/16" N.C.	1	.031	...	...	Flat hd. screw, 3/8"	1	.004
...	...	Washer, 21/32" I.D. x 1"	1	.016	...	...	N.C. x 1-1/2"	1	.016
...	...	O.D. No. 12 gage.	1	.001	...	...	Hex. jam nut, 3/8" N.C.	1	
...	...	Cotter, 1/8 x 1"	1	.004	...	...	Latch spring pin	2	
...	...	...	1		...	...	Latch, with spring pin	1	
...	...	...	1		...	...	Latch pin.	1	

SPARE PARTS CATALOG

ENGINE CONTROLS AND CONNECTIONS

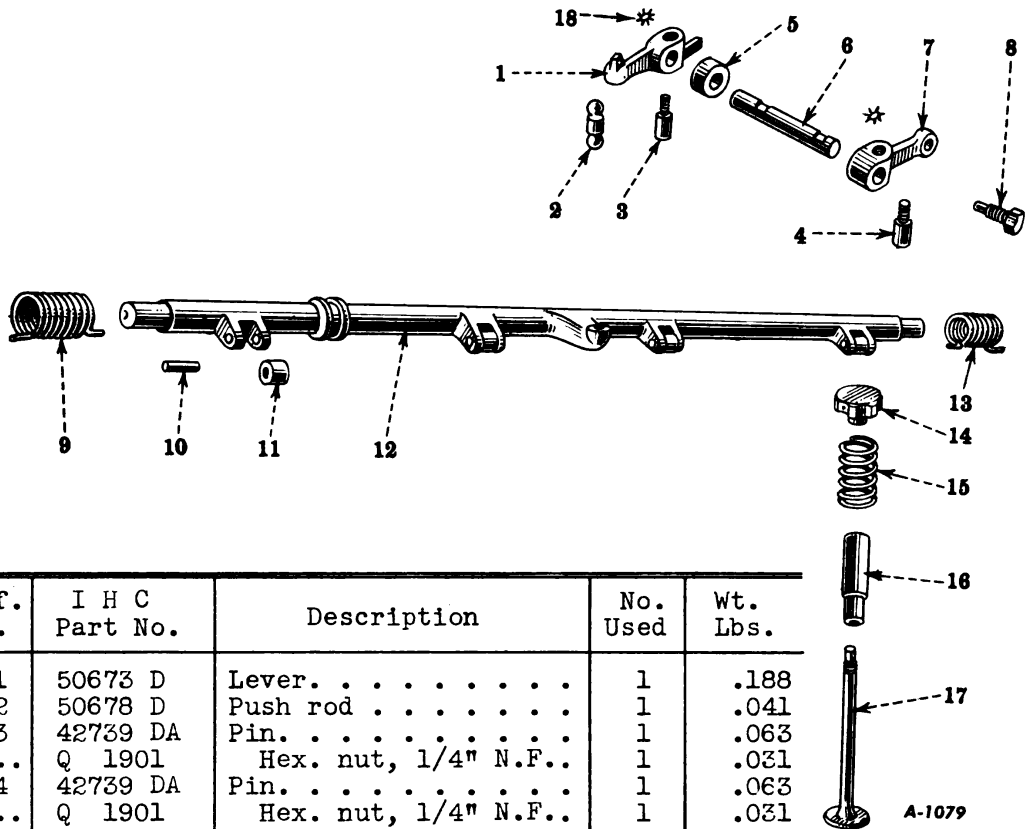


A-1078

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	41597 D	Compression release lever rubber handle (used on 8427 DX only) . .	1	
2	52405 D	Spring link	1	
3	52404 D	Spring.	1	
4	52406 D	Release rod	1	
...	Q 1905	Hex. nut, 3/8" N.F.	2	
...	.....	Cotter, 1/8 x 3/4".	1	
5	48906 D	Adjusting block	1	
...	.....	Cotter, 3/32 x 3/4".	1	
6	41597 D	Governor control lever rubber handle (used on 8426 DAX only) .	1	
7	15033 H	Adjusting yoke.	1	
8	15041 H	Pin	1	
...	.....	Cotter, 1/8 x 3/4".	1	
9	55748 D	Stop screw.	1	
...	Q 1906	Hex. nut, 3/8" N.C.	1	
...	8427 DX	Compression release lever, with rubber handle (optional)	1	
10	9634 D	Compression release lever, with steel handle (optional). . . .	1	
11	H 4213	Pivot pin	1	
...	.....	Cotter, 1/8 x 1".	1	
12	52403 D	Lever shaft	1	
...	8426 DAX	Governor control lever, with rubber handle (optional)	1	
13	9646 D	Governor control lever, with steel handle (optional). . . .	1	
14	52407 D	Control rod	1	
...	Q 1909	Hex. nut, 1/2" N.F.	1	
...	.....	Cotter, 1/8 x 3/4".	1	
16	55750 D	Primer control.	1	
...	.....	Cotter, 1/16 x 3/8".	1	
...	Q 5015	Governor control lever lubricator (Lincoln No. 5030).	1	

SPARE PARTS CATALOG

STARTING VALVES AND SHAFT



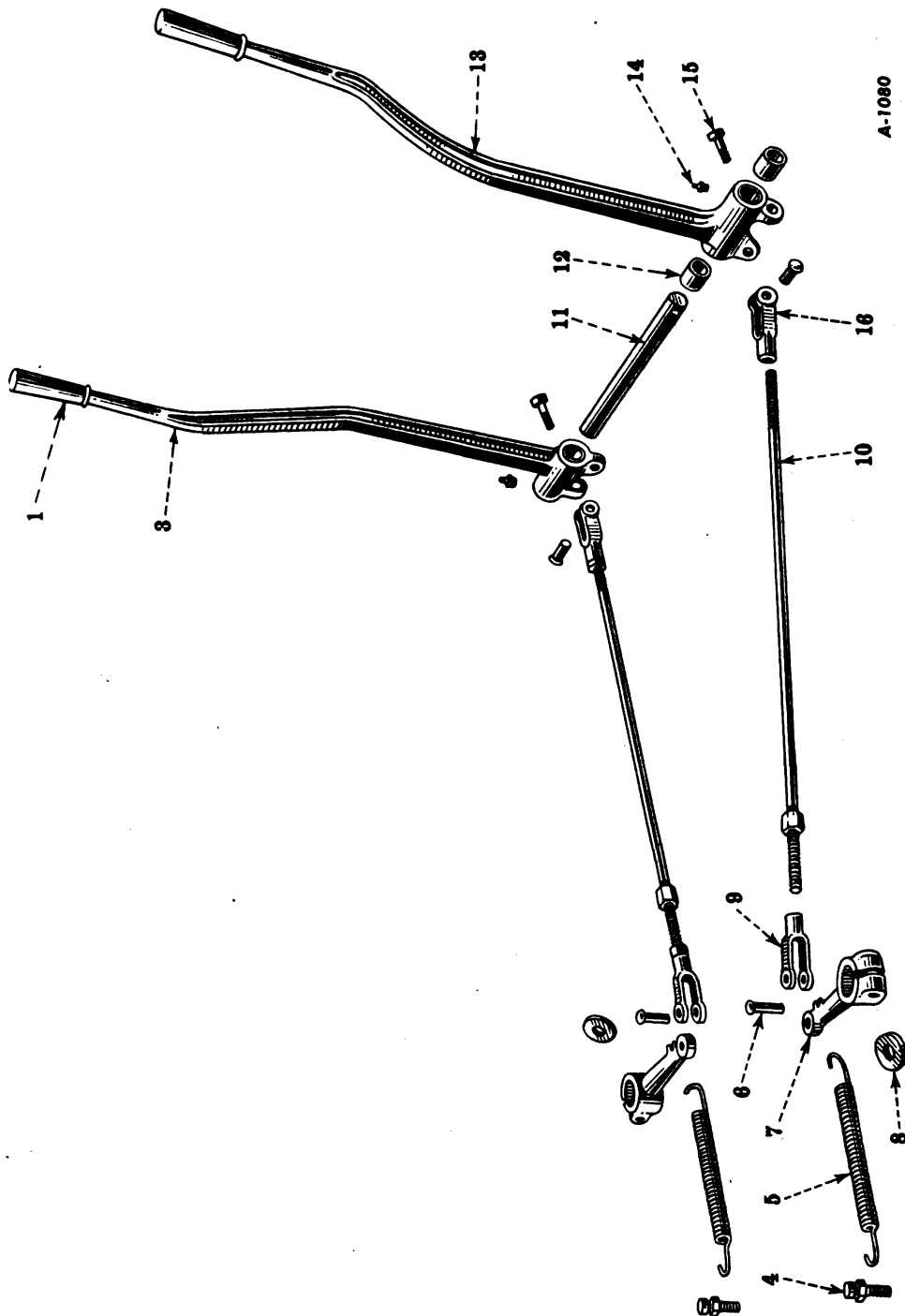
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50673 D	Lever.	1	.188
2	50678 D	Push rod	1	.041
3	42739 DA	Pin.	1	.063
...	Q 1901	Hex. nut, 1/4" N.F..	1	.031
4	42739 DA	Pin.	1	.063
...	Q 1901	Hex. nut, 1/4" N.F..	1	.031
5	42746 D	Oil seal	1	.063
6	50672 D	Operating shaft.	1	.188
7	53413 D	Lever, outer	1	.250
8	50674 D	Lever stop	1	.063
...	Q 1920	Lock washer, 3/8".	1	.007
9	46212 D	Shaft spring, rear	1	.063
10	24917 D	Roller pin	4	.012
11	24916 D	Cam roller	4	.025
12	50670 DX	Starting valve shaft, with roller and pin	1	4.000
13	46213 D	Shaft spring, front.	1	
14	42750 D	Retainer	4	.250
...	.....	Cotter, 3/32 x 1-1/2".	4	.003
15	32479 D	Valve spring	4	.063
16	5024 DAR	Valve guide.	4	.209
17	42749 D	Valve.	4	.250
18	2853 Y	Starting valve operating shaft pin lock washer (Shakeproof No. 1114)	1	

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

STEERING CLUTCH OPERATING LEVERS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

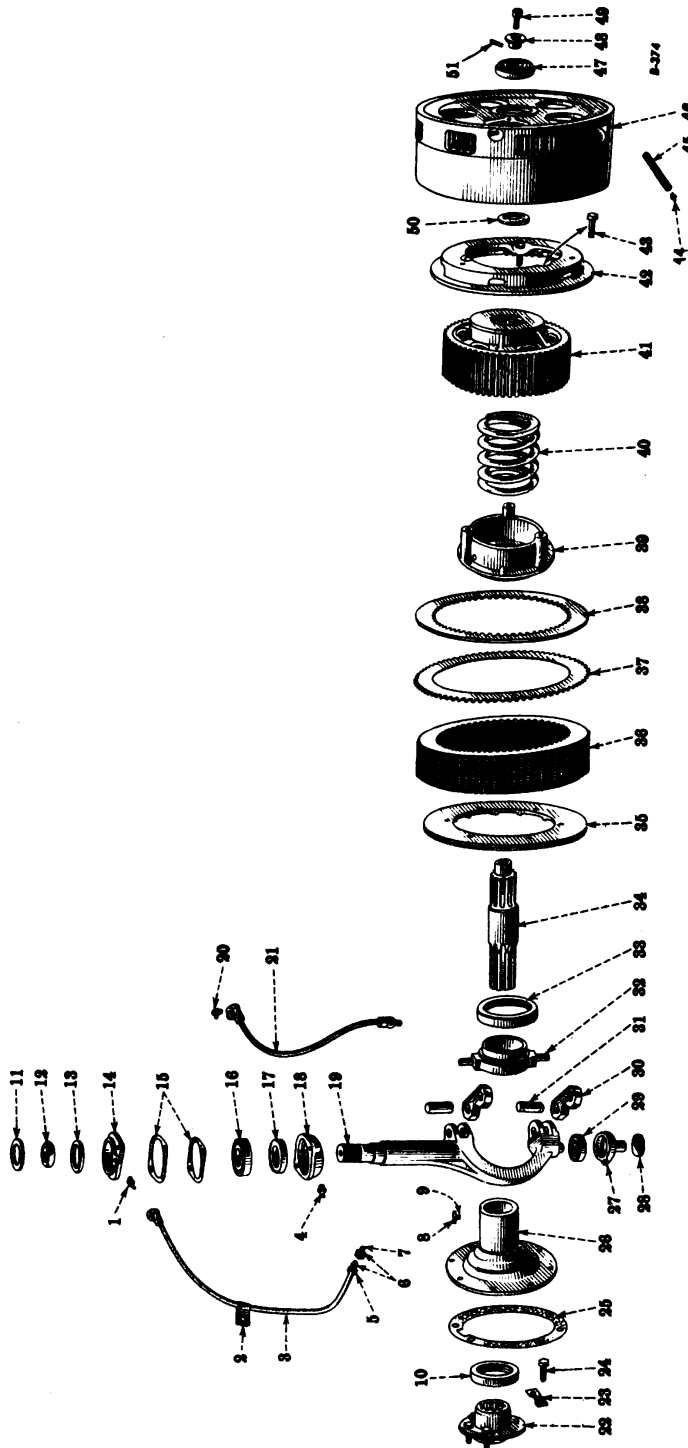
STEERING CLUTCH OPERATING LEVERS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	41597 D	Clutch lever rubber handle (used on 8683 DX and 8684 DX only)	2	.156	...	.....	Hex. nut, 1/2" N.C. (right hand thread)	2	.041
3	8683 DX	Steering clutch lever, left hand, with bushing and rubber handle (optional)	1	5.625	...	.....	Hex. nut, 1/2" N.C. (left hand thread)	2	.041
4	9641 DX	Steering clutch lever, left hand, with bushing and steel handle (optional)	1	5.625	11	56012 D	Shaft	1	2.500
5	41768 D	Spring anchor	1	.145	...	Q 1784	Cap screw, 5/16 x 2" N.C.	1	.047
6	1922	Lock washer, 1/2"	2	.013	...	Q 1919	Lock washer, 5/16"	1	.004
7	57288 D	Spring	2	6.500	12	42175 D	Bushing	1	.063
8	15041 H	Pin	4	.125	...	8684 DX	Steering clutch lever, right hand, with bushing and rubber handle (optional)	1	6.000
9	8679 DA	Release lever	4	.002	13	9642 DX	Steering clutch lever, right hand, with bushing and steel handle (optional)	1	6.000
10	1813	Cap screw, 3/8 x 2-1/2" N.F.	2	1.438	...	Q 3615	Lubricator (Lincoln No. 5000)	2	.016
11	.....	Hex. nut, 3/8" N.F.	2	.100	14	14186 DA	Lubricator (Alemite No. 1610)	2	.018
12	Q 1920	Lock washer, 3/8"	2	.006	15	46368 D	Adjusting screw	2	.188
13	45794 D	Retaining washer	2	.125	...	.....	Hex. jam nut, 1/2" N.F.	2	.063
14	Q 1849	Cap screw, 1/2 x 1-1/4" N.F.	2	.550	16	63229 D	Yoke (right hand thread)	2	.250
15	Q 1922	Lock washer, 1/2"	2	.013	...	.....	.....	2	.....
16	63228 D	Yoke (left hand thread)	2	.500	...	.....	.....	2	.....
17	63230 DX	Steering clutch operating rod	2	1.468	...	.....	.....	2	.....

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

STEERING CLUTCH AND RELEASE MECHANISM



Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	52343 DB Q 3617	Steering clutch. Lubricator (Lincoln No. 5003) (optional).	2	140.000	22	52345 D	Coupling (12 teeth).	2	5.250
2	13056 DA	Lubricator (Alemite No. 1607) (optional).	2	.031	23	50103 DA	Lock	6	.031
3	30665 D	Clamp.	2	.031	24	50822 D	Bolt	12	.104
4	56019 DX	Grease tube.	2	.036	25	49848 D	Gasket	2	.066
5	.....	Square head machine bolt, 1/4 x 3/4" N.C.	2	.281	26	8685 DX	Bearing cage cap, with oil seal.	2	14.000
6	.....	Hex. nut, 1/4" N.C.	4	.010	.....	.....	Cap screw, 9/16 x 1-5/8" N.C.	12	.156
7	.....	Lock washer, 1/4".	4	.006	.....	.....	Hex. nut, 9/16" N.F.	4	.031
8	.....	.....	4	.001	27	56016 D	Lock washer, 9/16"	16	.015
9	.....	.....	4	.....	.....	.....	Bearing pivot.	2	.047

SPARE PARTS CATALOG

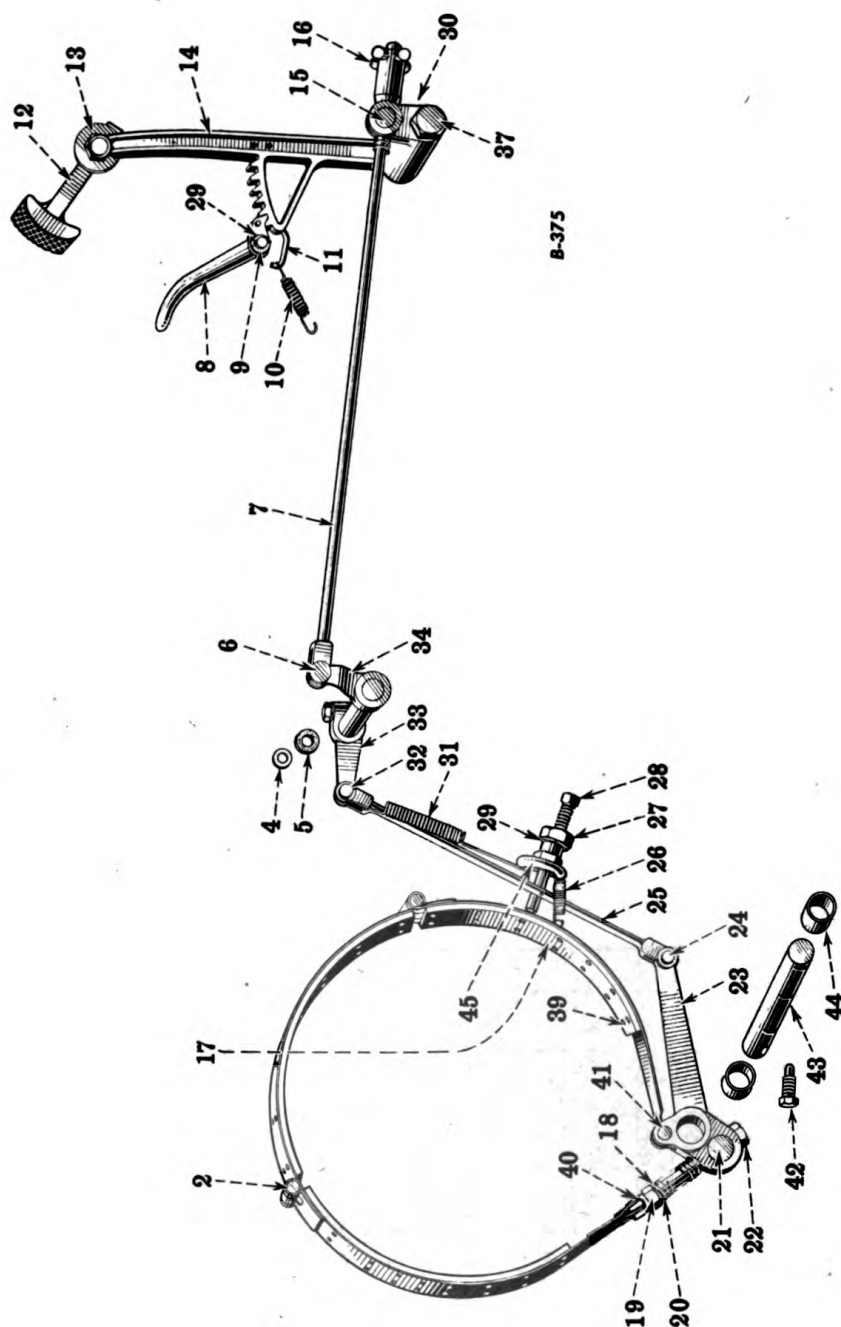
STEERING CLUTCH AND RELEASE MECHANISM - Continued

4	14186 DA	(Lincoln No. 5000) (optional) Lubricator (L.H.) (Alemit No. 1610) (optional)	1	.016	...	Q 1849	Cap screw, 1/2 x 1-1/4" N.F.	2	.550
	Q 3621	Lubricator (R.H.) (Lincoln No. 5300) (optional)	1	.015	29	Q 1922 56101 D	Lock washer, 1/2" Bearing (New Departure No. 8504)	2	.013
	13129 DA	Lubricator (R.H.) (Alemit No. 1612) (optional)	1	.031	30	56005 D	Shifter link	4	.250
	29899 D	Connector nut	1	.031	31	56007 D	Link pin	4	.250
5	35252 DX	Connector with nut	2	.025	32	...	Cotter, 1/8 x 1-1/4"	8	.004
6	35252 D	Connector	2	.063	33	40881 D	Release collar	2	4.500
7	56013 DX	Key, with pin	2	.031	34	53233 D	Thrust bearing (optional)	2	2.750
8	56006 D	Pin	2	.031	35	52344 DA	Shaft	2	16.500
9	50104 D	Oil seal	2	.006	...	5715 D	Plate	2	16.500
10	56017 D	Felt retainer	2	.781	...	Q 1850	Cap screw, 1/2 x 1-1/4" N.C.	12	.525
11	56010 D	Spacer	2	.083	36	Q 1922	Lock washer, 1/2"	12	.013
12	56008 D	Felt	2	.125	37	...	(See Note *)	1	.001
13	8680 D	Retainer	2	.008	38	40882 D	Driving disc	24	1.875
14	Q 1834	Cap screw, 7/16 x 1-1/2" N.C.	2	.625	39	40883 DB	Friction disc	26	1.125
...	Q 1921	Lock washer, 7/16"	4	.085	40	54491 DB	Spring retainer	2	13.125
15	56009 D	Gasket	4	.010	41	8352 DB	Hub	2	9.671
16	20308 D	Bearing (New Departure No. 3207) (optional)	2	.005	42	6974 DA	Pressure plate	2	38.000
17	ST 205	Bearing (IHC) (optional)	2	.688	43	54968 D	Dowel	2	21.000
18	21969 D	Oil seal	2	.156	...	Q 1922	Lock washer, 1/2"	6	.125
	8682 DX	Bearing cage, with oil seal	2	1.375	44	Q 3618	Lubricator (Lincoln No. 5060) (optional)	6	.013
19	56020 D	Release fork	2	13.625	45	18220 DA	Lubricator (Alemit No. 1631) (optional)	2	.010
20	Q 3617	Lubricator (Lincoln No. 5003) (optional)	2	.031	46	54652 D	Lubricator pipe	2	.016
	13056 DA	Lubricator (Alemit No. 1607) (optional)	2	.031	47	8519 D	Drum	2	.156
21	51431 DX	Grease tube	2	.343	...	...	Cap screw, 1/2" N.F. x 1-1/8"	2	75.000
...	...	Standard iron pipe	2	.031	...	Q 1922	Lock washer, 1/2"	16	.114
...	...	close nipple, 1/8"	2	.015	47	53389 D	Pilot bearing (New Departure No. 48508)	16	.013
...	...	Square head machine bolt, 1/4 x 3/4" N.C.	4	.010	48	50098 DA	Retainer	2	1.093
...	Q 1902	Hex. nut, 1/4" N.C.	4	.006	49	50098 DAX	Retainer with pin	2	.188
...	Q 1918	Lock washer, 1/4"	4	.002	50	50099 D	Retainer bolt	2	.219
					51	Q 1922	Lock washer, 1/2"	2	.125
						50096 DA	Spacer	2	.013
						57750 D	Steering clutch pilot bearing retainer pin	2	.500

* This assembly is made up of a group of driving discs (Ref. No. 37) and a group of friction discs (Ref. No. 38)

SPARE PARTS CATALOG

STEERING BRAKES AND CONTROLS



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

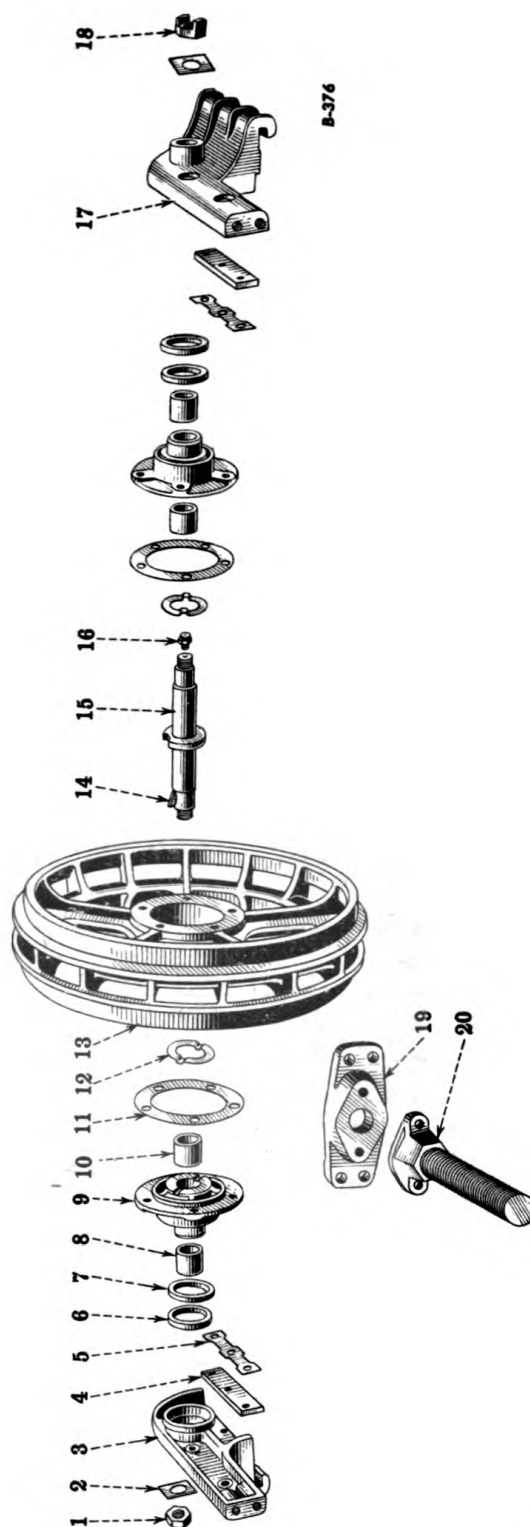
STEERING BRAKES AND CONTROLS - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
2	60267 DA	Brake band assembly.	2	12.25	26	56478 D	Anchor spring with hook.	2	.031
3	60266 D	Pin.	4	.218	27	56476 D	Spring hook.	4	.012
4	20841 D	Key for lever, inner	4	.004	28	56475 D	Anchor spring.	2	.025
5	41519 D	Seal	2	.031	29	Q 1912	Nut (5/8" N.C.)	2	.085
6	15041 H	Rod pin.	2	.005	30	41495 D	Set screw.	2	.406
7	41512 DA	Rod, outer	2	.125	31	41509 D	Stud washer.	2	.005
8	5818 D	Pawl	2	.004	32	Q 3621	Pedal shaft lubricator (Lincoln No. 5300) (optional).	2	.031
9	41523 D	Pawl stud.	2	.50	33	13129 DA	Pedal shaft lubricator (Alemite No. 1612) (optional).	2	.031
10	Q 1922	Lock washer, 1/2"	2	.125	34	49970 D	Release spring.	2	.187
11	41935 D	Cotter, 1/8 x 7/8"	2	.013	35	41999 D	Pin, upper.	2	.093
12	Q 1774	Pawl spring.	2	.006	36	5813 D	Cotter, 1/8 x 3/4"	2	.004
13	41521 D	Cap screw, 5/16 x 3/4" N.C.	2	.031	37	.....	Lever, inner.	2	.75
14	41522 D	Hex. jam nut, 5/16" N.C.	2	.02	38	.....	Cap screw, 1/2 x 1-5/8" N.C.	2	.125
15	5815 D	Pawl link, left hand.	1	.015	39	Q 1922	Lock washer, 1/2"	2	.013
16	41524 D	Pawl link, right hand.	1	.062	40	49964 D	Lever, outer, left hand.	1	2.00
17	Q 1913	Pedal pad.	2	.045	41	49965 D	Lever, outer, right hand.	1	1.875
18	Q 1927	Swivel	2	.001	42	49978 D	Pedal shaft.	2	2.00
19	6915 DA	Hex. nut, 3/4" N.F.	2	2.25	43	21407 H	Lining rivet (.186 x 7/16")	80	.004
20	6916 DA	Lock washer, 3/4"	2	.578	44	61175 V	Lining rivet, (.186 x 5/8")	16	.004
21	41508 D	Pedal, left hand.	2	.12	45	41498 D	Adjusting bolt spacer pin.	2	.041
22	5812 D	Pedal, right hand.	2	.046	46	49963 D	Cotter, 3/16x1-1/2"	2	.375
23	68631 D	Pivot pin.	1	6.562	47	.....	Shaft stud.	2	.012
24	Q 1911	Adjusting knob.	2	.437	48	41491 D	Lock washer, 1/2"	2	.125
25	41496 D	Brake band lining.	2	1.00	49	Q 1922	Pivot shaft.	2	.013
26	5812 D	Washer	6	.75	50	49962 D	Bushing.	4	1.906
27	41497 D	Nut (5/8" N.F.)	2	.012	51	41493 D	Anchor	2	.312
28	41501 D	Spring	2	.085	52	43664 DA	Hex. jam nut, 1" N.C.	2	.156
29	41499 D	Pin.	2	.086	53	.....	Lock washer, 1"	2	.097
30	6912 DX	Bolt	2	.937					
31	15041 H	Lever, with bushing.	2	.562					
32	.....	Pin.	2	4.00					
33	.....	Cotter, 1/8 x 3/4"	2	.125					
34	49966 D	Rod, inner	2	.004					
35	.....		2	1.062					

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

FRONT IDLER ASSEMBLY



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

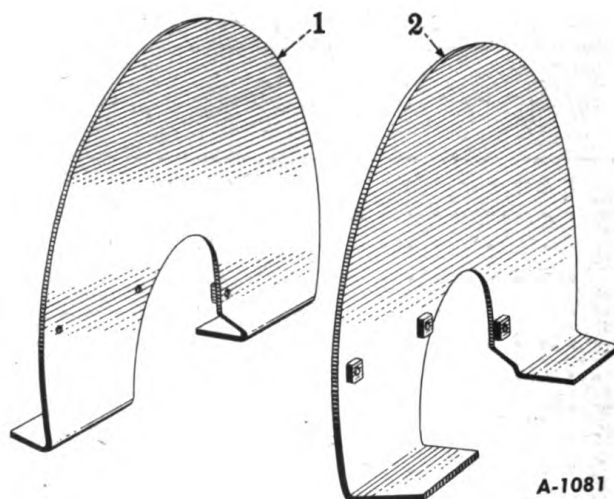
SPARE PARTS CATALOG

FRONT IDLER ASSEMBLY

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	15644 D	Nut, inner.	2	.563
2	45797 D	Nut lock.	4	.080
3	6874 DAX	Guide (inner, right hand - outer, left hand) with oil seal.	1	29.000
4	49735 D	Guide retainer.	4	2.500
...	Q 1872	Cap screw, 5/8 x 1-3/4" N.C.	12	.200
5	49736 D	Retainer bolt lock.	4	.219
6	31119 D	Oil seal.	4	.281
7	47576 D	Felt washer	4	.036
8	49738 DX	Bushing set	1	.312
9	6880 DAX	Carrier, with bushing	4	12.750
10	49738 DX	Bushing set	1	.029
11	49739 D	Gasket.	4	.375
12	49741 DAX	Thrust washer set	2	155.000
13	6879 D	Front idler	2	.062
14	SA 3215	Key (Woodruff No. G)	2	11.812
15	49740 D	Shaft	2	.125
16	{ 17829 D	Lubricator (Alemite No. 1511) (optional)	2	
	{ 37290 D	Lubricator (Lincoln No. 5750) (optional)	2	
17	6875 DAX	Guide (inner, left hand - outer, right hand) with oil seal.	1	29.000
18	18573 DA	Nut, outer.	2	.687
19	6878 D	Guide cross plate	2	.625
...	Q 1894	Cap screw, 3/4 x 2-1/2" N.C.	8	.437
...	Q 1927	Lock washer, 3/4"	8	.045
20	41853 DB	Adjuster.	2	14.000
...	.....	Cadmium plated cap screw, 5/8 x 1-1/2" N.F.	4	.250
...	.....	Cadmium plated lock washer, 5/8"	4	.023
...	15944 D	Front idler carrier bolt nut.	10	.125
...	19574 D	Front idler carrier bolt lock washer.	10	.005
...	57733 D	(Shakeproof No. 1228)	10	.005
...		Front idler carrier bolt.	10	.437

SPARE PARTS CATALOG

FRONT IDLER SHIELD ATTACHMENT (53980 D)

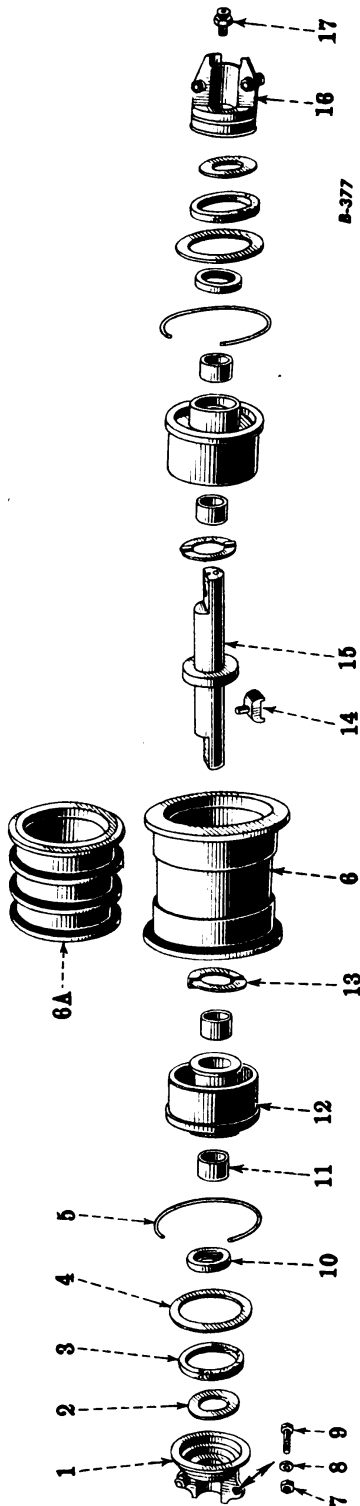


Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50841 DX	Shield, left hand - outer, and right hand - inner.	2	20.50
...	.....	Cap screw, 1/2" N.F. x 1-7/8".	6	.138
...	Q 1922	Lock washer, 1/2".	6	.013
2	50842 DX	Shield, right hand - outer, and left hand - inner.	2	20.00
...	Q 1853	Cap screw, 1/2" N.F. x 1-3/4".	6	.138
...	Q 1922	Lock washer, 1/2".	6	.013

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

TRACK ROLLER ASSEMBLY

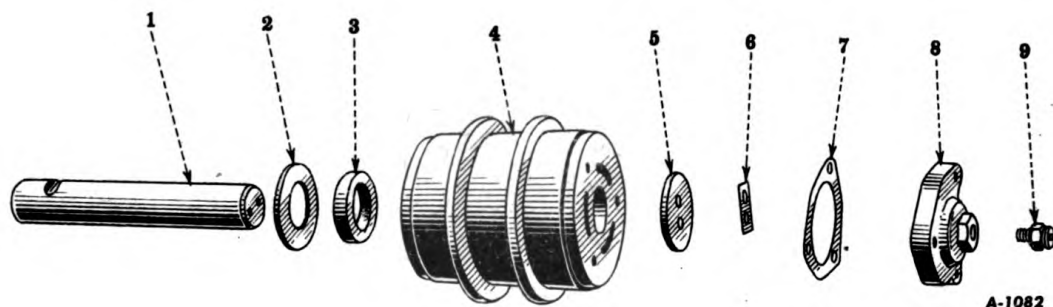


Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	52364 D	Track roller with shaft and carriers (Nos. 1, 3 and 5)	6	109.125	9	Q 4078	Cap screw, 9/16" x 1-3/4" N.F.	20	
...	52365 D	Track roller with shaft and carriers (Nos. 2 and 4)	4	115.125	10	35149 DA	Oil seal	20	
1	8357 D	Bracket, inner	10		11	49748 DX	Bushing set	10	
2	49734 D	Washer, outer	20		12	.8356 DY	Carrier set	10	
3	35132 D	Washer, center	20		13	49741 DAX	Thrust washer set	10	
4	52366 D	Washer, inner	20		14	6485 D	Oil scupper	10	
5	49749 D	Snap ring	20		15	52367 D	Shaft	10	
6A	49745 D	Roller (single flange) (1, 3 and 5)	4		16	8358 D	Bracket, outer	10	
6	49746 D	Roller (double flange) (2 and 4)	4		...	Q 4078	Cap screw, 9/16" N.F. x 1-3/4"	20	
7	.....	Hex. nut, 9/16" N.F.	20		...	.....	Hex. nut, 9/16" N.F.	20	
8	Q 1924	Lock washer, 9/16"	20		...	Q 1924	Lock washer, 9/16"	20	
					...	37290 D	Lubricator (Lincoln No. 5750)	10	
					17	17829 D	Lubricator (Alemite No. 1511)	10	

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

TRACK IDLER



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

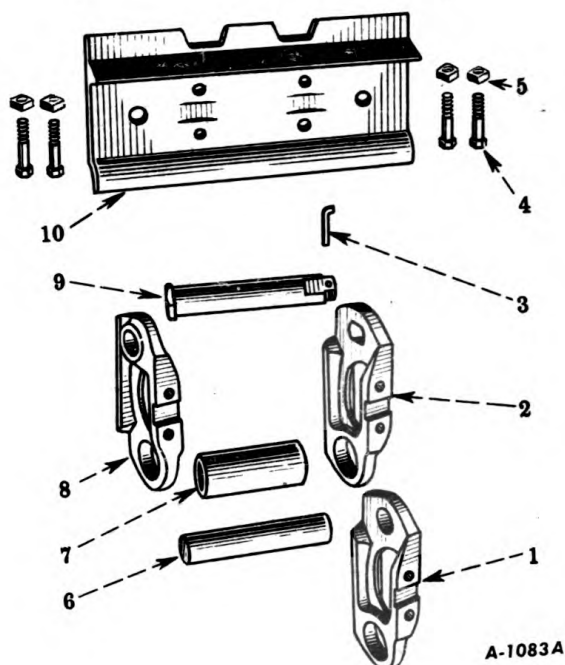
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	49728 D	Idler shaft.	4	9.75
2	49734 D	Felt washer.	4	.018
3	21795 D	Oil seal	4	.25
4	6873 DAX	Idler, with oil seal	4	31.25
5	23260 D	Thrust washer.	4	.513
...	Q 1849	Cap screw, 1/2 x 1-1/4" N.F.	8	.110
6	35089 DA	Bolt lock.	4	.025
7	23261 D	Gasket	4	.005
8	5235 DA	Idler cap.	4	2.50
...	Q 1852	Cap screw, 1/2 x 1-1/2" N.C.	12	.12
...	Q 1922	Lock washer, 1/2"	12	.012
9	37290 D	Lubricator (Lincoln No. 5750) (optional)	4	.120
	17829 D	Lubricator (Alemite No. 1511) (optional)	4	

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

TRACK LINK PIN AND SHOE ASSEMBLY

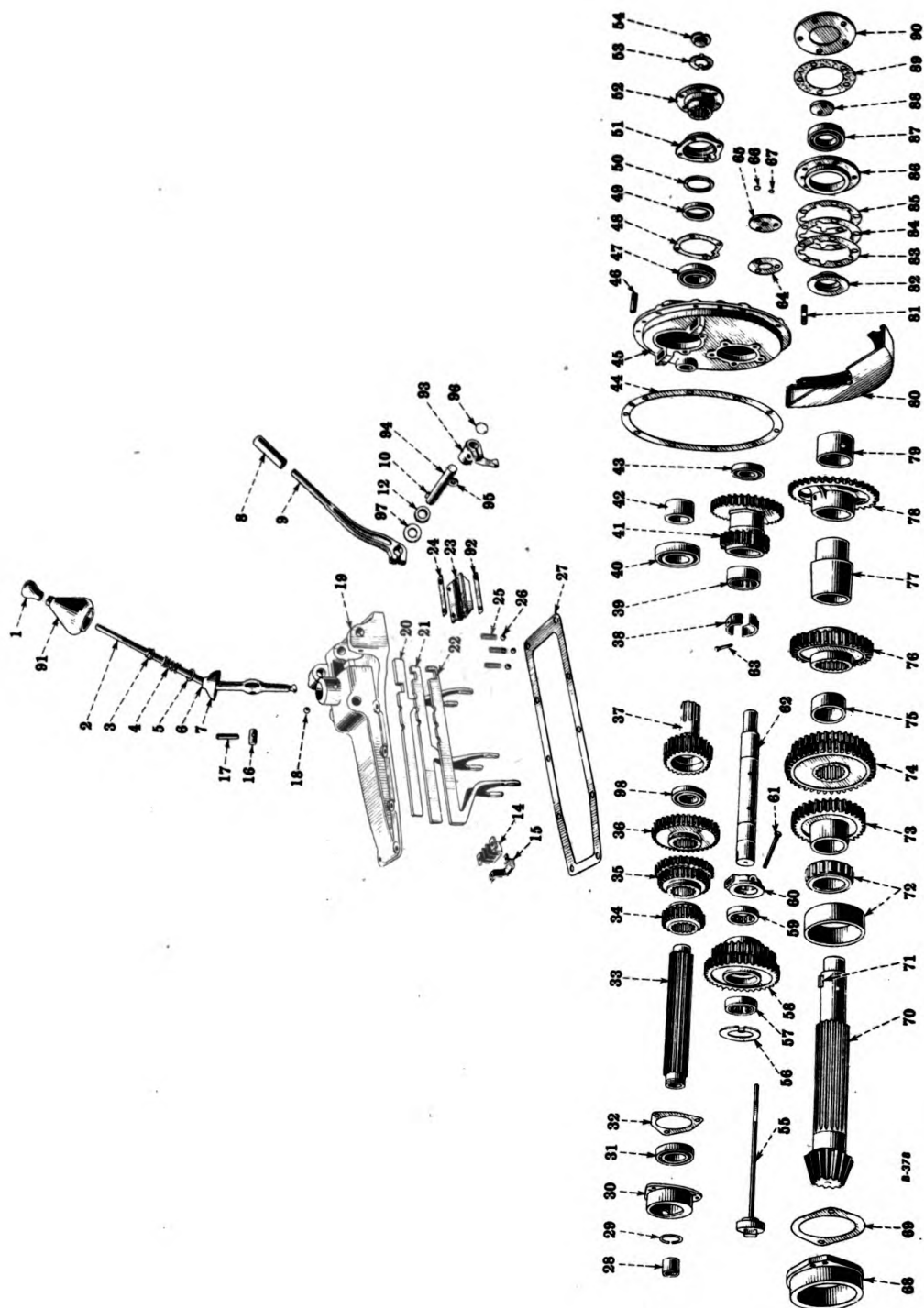


Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
...	65103 D	Track (less shoes)	2	675.000
...	65265 D	Track with 18" track shoes (flat) . .	2	1655.000
1	52351 DA	Link, right hand.	70	6.500
2	52352 DA	Master link	2	6.062
3	43712 DB	Lock wire	2	.029
4	49762 DA	Cap screw	288	.219
5	60204 DA	Nut	288	.250
6	49761 DA	Pin	70	3.562
7	49759 D	Bushing	72	2.875
8	52350 DA	Link, left hand	72	6.750
9	49760 D	Master link pin	2	3.750
10	51074 DC	Shoe (18") (flat)	72	26.000

SPARE PARTS CATALOG

TRANSMISSION



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

Transmission -
Page

TRANSMISSION - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	53717 DA	Shifter lever rubber ball used on 42512 DAX	1		20	64623 D	H1-Lo shifter rail	1	
	9637 D	Shifter lever cast iron ball on lever 67350 DX (optional)	1		21	64627 D	Second and third shifter rail	1	
	42512 DAX	Gear shift lever less rubber ball	1		22	64625 D	Low and reverse shifter rail	1	
2	67350 DX	Gear shift lever with cast iron ball (optional in place of 42512 DAX and 53717 DA)	1		23	42517 D	Guide, front	1	
3	11373 D	Spring stop, upper	1		...	.....	Countersunk head steel rivet, No. 9 - 1/2"	2	
...	...	Round head iron rivet, 3/16 x 1-1/4"	1		...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	4	
4	29547 D	Spring	1		24	62781 D	Bolt lock	4	
5	17700 D	Spring stop, lower	1		25	64163 D	Poppet spring	3	
6	20887 D	Bushing	1		26	4596 D	Poppet ball (optional)	3	
7	42496 DX	Swivel housing shield, with bushing	1		27	13722 D	Poppet ball (optional)	3	
8	41597 D	H1-Lo shifter lever rubber handle used on 5938 DAX	1		28	42511 D	Gasket	1	
	5938 DAX	H1-Lo shifter lever, with rubber handle (41597 D) (optional)	1		29	50025 D	Bushing	1	
9	9638 DX	H1-Lo shifter lever (steel) (optional)	1		30	50027 D	Snap ring	1	
...	...	Cap screw, 1/2" x 1-5/8" N.C.	1		31	8362 DA	Bearing cage, rear	1	
10	Q 1922	Lock washer, 1/2"	1		32	64630 D	Bearing (New Departure No. 77511)	2	
11	7220 T	Key (Woodruff No. 9)	1		33	50026 D	Retainer	1	
12	17053 D	Oil seal felt	1		...	.....	Cap screw, 3/8x1-1/8" N.C.	3	
14	42518 D	Guide, rear	1		...	Q 1920	Lock washer, 3/8"	3	
...	...	Countersunk head steel rivet, No. 9 - 1/2"	1		33	52376 DX	Spline shaft, with bushing	1	
15	Q 1800	Cap screw, 3/8 x 3/4" N.C.	1		34	52375 D	Gear (23 teeth)	1	
16	40465 DX	Bolt lock	1		35	52381 D	Gear	1	
17	40466 DX	Shaft, large, with plug	1		36	52379 D	H1-Lo sliding gear (26 and 39 teeth)	1	
18	13115 D	Plug	1		37	52380 D	Driving shaft gear (36 teeth)	1	
19	9456 DX	Housing, with plug	2		38	56470 D	Bearing retainer, rear	1	
...	Q 4017	Cap screw, 3/8 x 7/8" N.C.	1		39	75238 H	Bearing, rear (New Departure No. 3210)	1	
...	Q 1852	Cap screw, 1/2x1-1/8" N.C.	4		...	18510 D	Bearing (optional) (New Departure No. 3213)	1	
...	...	Cap screw, 3/8x1-1/8" N.C.	4		40	ST 219	Bearing (IHC) (optional)	1	
...	Q 1920	Lock washer, 3/8"	2		41	56472 D	H1-Lo gear (21 and 33 teeth)	1	
...	Q 1922	Lock washer, 1/2"	6		42	50082 D	Spacer	1	
			4		43	18575 H	Bearing (optional) (New Departure No. 1208)	1	
			4		44	ST 214	Bearing (IHC) (optional)	1	
			4		45	50085 D	Gasket	1	
			4		46	64631 D	End cover, with studs	1	
			4		...	Q 1852	Cap screw, 1/2" N.C. x 1-1/2"	6	
			4		...	Q 1910	Hex. nut, 1/2" N.F.	4	
			6		...	Q 1922	Lock washer, 1/2"	10	
			4		46	18585 DA	Dowel	1	

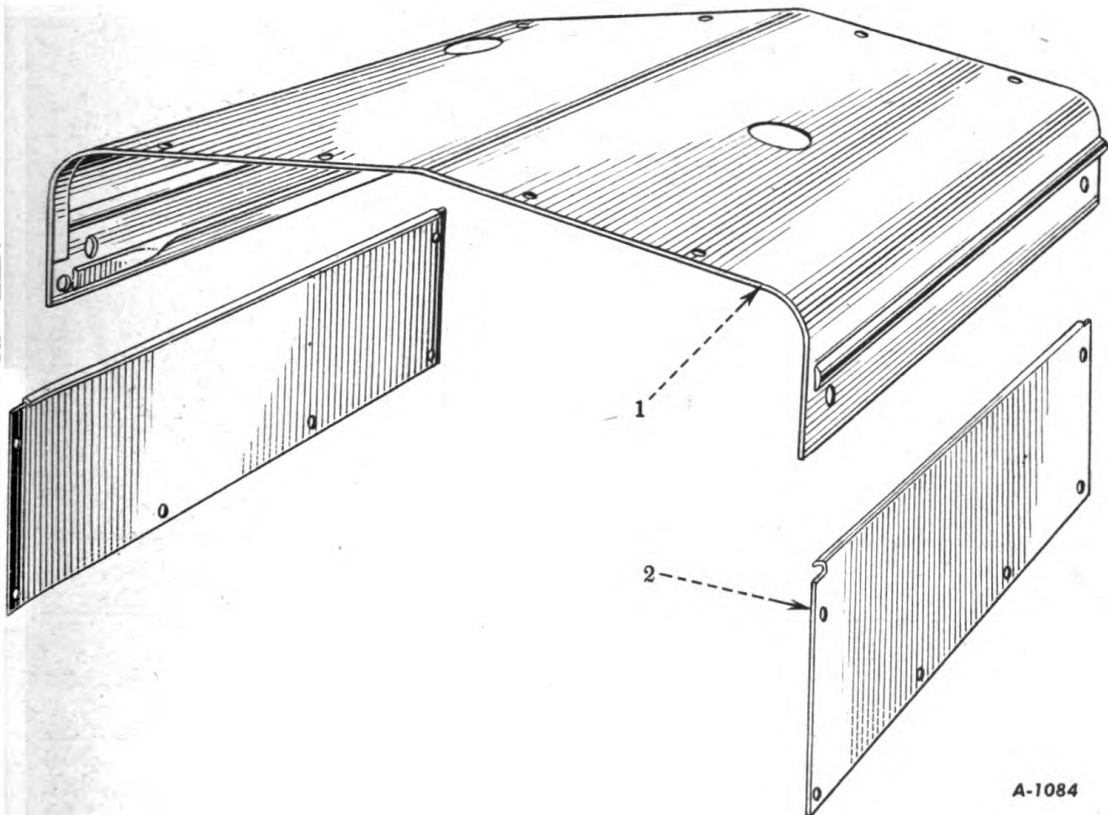
SPARE PARTS CATALOG

TRANSMISSION - Continued

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.	Ref.	I H C Part No.	Description	No. Used	Wt. Lbs.
47	18511 D	Bearing, front (New Departure No. 3212)	1		75	50004 D	Spacer	1	.937
48	50083 D	Gasket	1		76	52374 D	Gear (32 teeth)	1	9.000
49	52384 D	Oil seal	1		77	6922 D	Oil gear sleeve	1	4.125
50	53709 D	Felt washer	1	.312	78	6923 DBX	Oil gear (37 teeth)	1	5.000
51	53710 D	Retainer	1	.010	79	50006 DA	Bushing	1	.500
...	Q 1802	Cap screw, 3/8 x 1" N.C.	4	2.250	80	52372 DA	Reservoir	1	1.750
...	Q 1920	Lock washer, 3/8"	4	.045	...	Q 1910	Hex. nut, 1/2" N.C.	4	.045
52	52377 D	Driving flange	1	.005	...	Q 1922	Lock washer, 1/2"	4	.013
53	50087 D	Nut lock	1	.062	81	64632 D	Stud	1	.035
54	50088 D	Nut	1	.656	...	Q 1909	Hex. nut, 1/2" N.F.	1	.045
55	50090 DB	Oil level rod	1	1.125	...	Q 1922	Lock washer, 1/2"	1	.013
56	50015 D	Thrust washer	1	.187	82	6981 D	Spacer	1	.750
57	50017 D	Bearing (New Departure No. 1208-TS)	1		83	50010 DB	Shim, heavy	1	.200
58	50016 D	Idle gear (29 and 36 teeth)	1	.656	84	50011 DB	Shim, medium	1	.062
59	50017 D	Bearing (New Departure No. 1208-TS)	1	17.500	85	50012 DB	Shim, light	1	.019
60	8361 D	Oil scoop	1	.656	86	9458 D	Bearing cage	1	4.000
61	50018 D	Bolt	1	1.000	87	55806 D	Bearing, front (New Departure No. 5510)	1	1.687
...	Q 1652	Castle hex. nut, 3/8" N.F.	1	.166	88	50009 D	Washer	1	.312
62	56471 D	Cotter, 3/32 x 3/4"	1	.016	...	Q 1849	Cap screw, 1/2x1-1/4" N.F.	2	.110
63	56469 D	Idle shaft	1	.002	...	Q 1922	Lock washer, 1/2"	2	.013
...	Q 1652	Retainer bolt	1	13.625	89	50013 DB	Gasket	1	.013
64	50023 D	Castle hex. nut, 3/8" N.F.	1	.109	90	6925 DB	Retainer, front	1	2.000
65	50021 D	Cotter, 3/32 x 3/4"	1	.016	...	Q 1856	Cap screw, 1/2 x 2" N.C.	4	.125
...	Q 1802	Gasket	1	.002	91	64603 D	Lock washer, 1/2"	4	.013
66	21491 H	Lock washer (Shakeproof No. 1120)	1	.110	92	62782 D	Gear shifter boot	1	.187
67	18868 D	Retaining bolt washer (Shakeproof No. 1124)	3	.001	93	64606 D	Bolt lock, right hand	1	.062
68	6921 DA	Bearing cage, rear	1	.001	...	Q 1849	Hi-Lo gear shifter arm	1	.750
69	50001 D	Retainer	1	3.500	...	Q 1922	Cap screw, 1/2" N.F.x1-1/4"	1	.110
...	Q 1804	Cap screw, 3/8x1-1/4" N.C.	3	.050	94	64607 D	Hi-Lo gear shifter arm	1	.013
...	Q 1920	Lock washer, 3/8"	3	.005	95	64608 D	Hi-Lo gear shifter arm key	1	.937
70	64628 D	Bevel pinion and shaft with drive bevel gear	1	81.000	96	23007 V	Hi-Lo gear shifter arm	1	.016
71	10430 V	Key (Woodruff No. 18)	1	.031	97	64609 D	Shaft plug	1	.031
72	52386 D	Roller assembly and outer race (Hyatt No. BU-5214-Z)	1		...	64604 D	Gear shifter boot clamp	1	.062
...	...	...	...	...	...	...	Cadmium plated round head stove bolt No. 8 - 32 x 3/4"	1	.031
73	52378 D	Reverse gear (32 teeth)	1	4.719	...	...	Cadmium plated square stove bolt nut, No. 8-32	1	.004
74	52382 D	Gear (35 and 40 teeth)	1	10.000	98	21559 D	Transmission spline shaft bearing, front (N.D. No. 3211)	1	1.406
...	...	...	...	38.000	...	62780 DX	Gear shifter rail guide bolt lock set	1	.125

SPARE PARTS CATALOG

ENGINE HOOD AND SIDE SHEETS



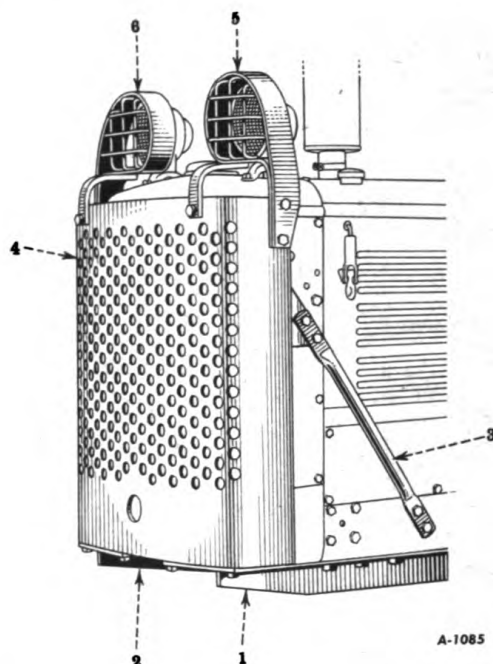
A-1084

When ordering, always use I H C Part Nos.

Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	52412 DAX	Hood.	1	35.000
...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	8	.035
...	.....	Slotted flat head bolt, 3/8 x 1-1/4" N.C.	2	.075
...	Q 1920	Lock washer, 3/8"	12	.005
...	.....	Washer, 13/32" I.D. x 7/8" O.D. x No. 16 gage	8	.025
...	Q 1906	Hex. nut, 3/8" N.C.	2	.016
2	50510 D	Side sheet, right hand or left hand	2	12.000
...	Q 1800	Cap screw, 3/8 x 3/4" N.C.	12	.035
...	Q 1920	Lock washer, 3/8"	12	.005

SPARE PARTS CATALOG

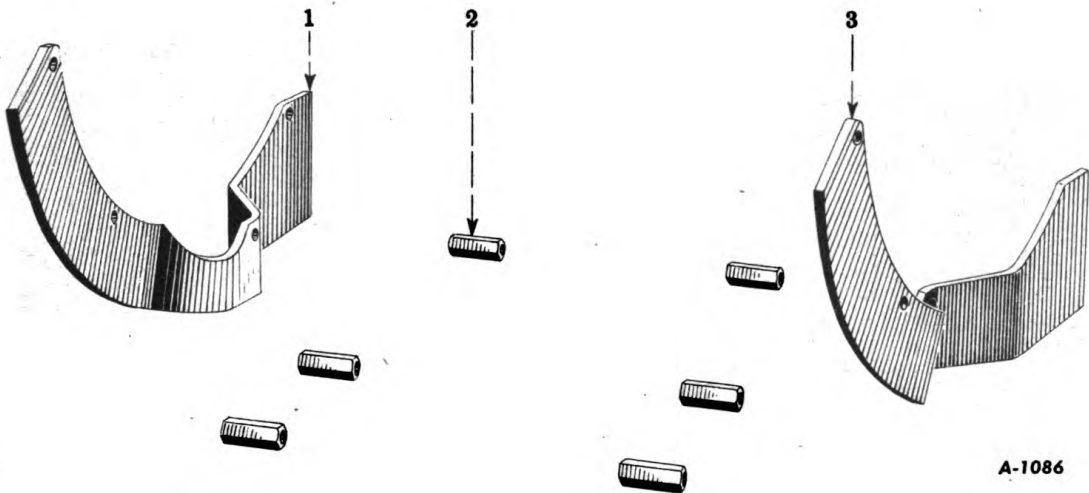
RADIATOR GUARD AND HEAD LAMP BRUSH GUARDS



Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	50873 D	Radiator guard support bracket, left hand	1	21.125
2	50874 D	Radiator guard support bracket, right hand	1	21.000
...	Q 1888	Cap screw, 3/4" N.C. x 1-3/4"	2	.308
...	...	Cap screw, 3/4" N.F. x 1-5/8"	4	.281
...	Q 1914	Hex. nut, 3/4" N.F.	4	.120
...	Q 1927	Lock washer, 3/4"	4	.045
...	...	Washer, 25/32" I.D. x 1-1/2" O.D. x 10 ga.	2	
3	50877 DAX	Radiator guard brace.	2	8.156
...	Q 1871	Cap screw, 5/8" N.F. x 1-3/4"	4	.225
...	Q 1875	Cap screw, 5/8" N.F. x 2-1/4"	4	.266
...	Q 1911	Hex. nut, 5/8" N.F.	8	.085
...	Q 1925	Lock washer, 5/8"	8	.024
4	63887 DX	Radiator guard.	1	92.000
5	63889 DX	Head lamp brush guard, left hand.	1	13.500
...	Q 1851	Cap screw, 1/2" N.F. x 1-1/2"	2	.125
...	Q 1909	Hex. nut, 1/2" N.F.	2	.037
...	Q 1922	Lock washer, 1/2"	2	.013
...	Q 1871	Cap screw, 5/8" N.F. x 1-3/4"	1	.225
...	Q 1911	Hex. nut, 5/8" N.F.	1	.085
...	Q 1925	Lock washer, 5/8"	1	.024
6	63890 DX	Head lamp brush guard, right hand	1	13.500
...	Q 1851	Cap screw, 1/2" N.F. x 1-1/2"	2	.125
...	Q 1909	Hex. nut, 1/2" N.F.	2	.037
...	Q 1922	Lock washer, 1/2"	2	.013
...	Q 1871	Cap screw, 5/8" N.F. x 1-3/4"	1	.225
...	Q 1911	Hex. nut, 5/8" N.F.	1	.085
...	Q 1925	Lock washer, 5/8"	1	.024

SPARE PARTS CATALOG

SPROCKET ROCK DEFLECTOR (54210 D)



A-1086

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

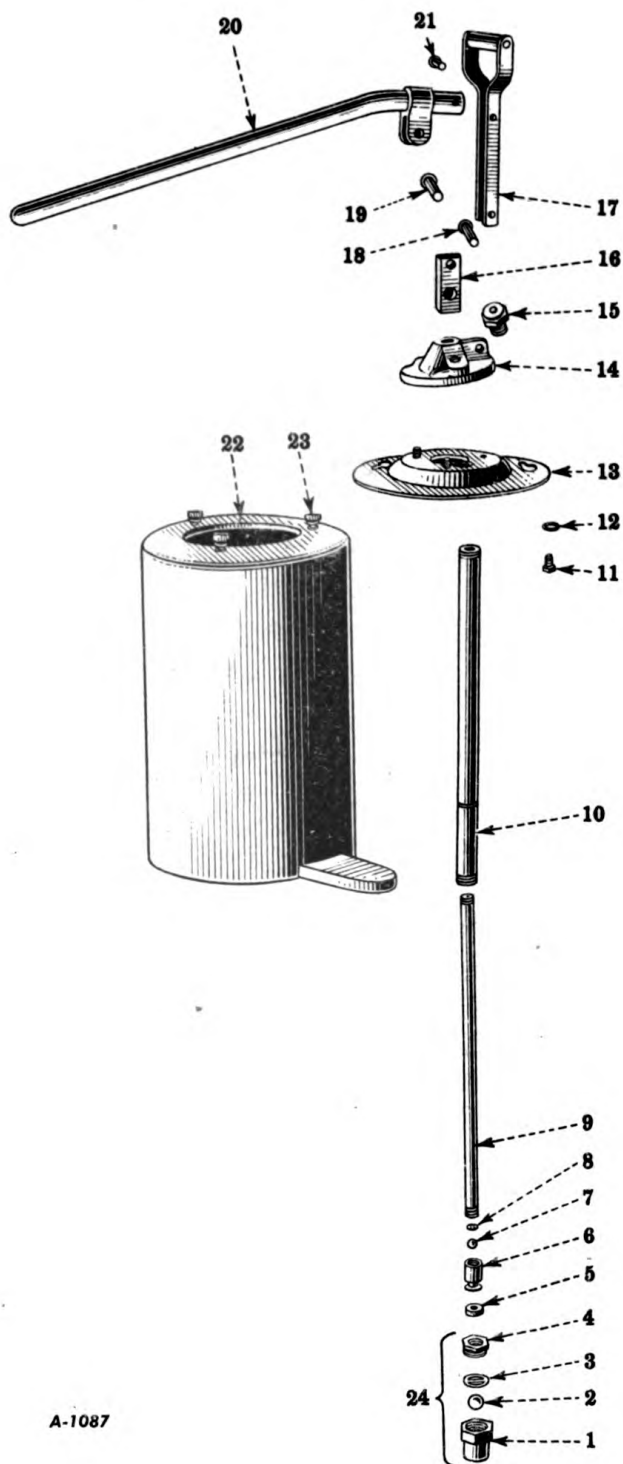
Ref. No.	I H C Part No.	Description	No. Used	Wt. Lbs.
1	54118 D	Sprocket rock deflector (left hand) .	1	13.438
...	Q 1849	Cap screw, 1/2" N.F. x 1-1/4"	3	.150
...	.....	Cap screw, 1/2" N.F. x 2-3/8"	1	.168
...	Q 1909	Hex. nut, 1/2" N.F.	1	.109
...	Q 1922	Lock washer, 1/2"	4	.013
2	54121 D	Sprocket rock deflector spacer.	6	.375
3	54119 D	Sprocket rock deflector (right hand). .	1	4.188
...	Q 1849	Cap screw, 1/2" N.F. x 1-1/4"	3	.150
...	.....	Cap screw, 1/2" N.F. x 2-3/8"	1	.168
...	Q 1909	Hex. nut, 1/2" N.F.	1	.109
...	Q 1922	Lock washer, 1/2"	4	.013

When ordering, always use I H C Part Nos.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

LINCOLN BUCKET LUBRICATOR



A-1087

Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Don't order parts from the illustrations only; refer to the list also.

SPARE PARTS CATALOG

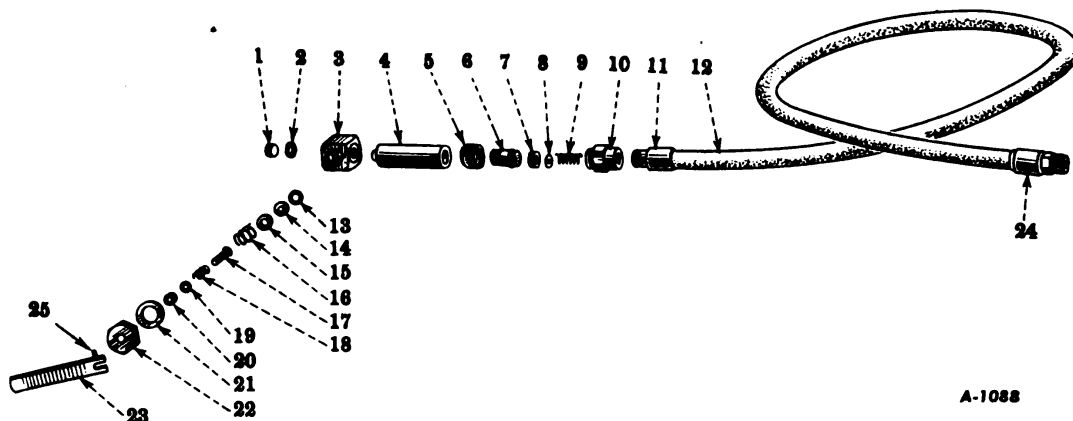
LINCOLN BUCKET LUBRICATOR - Continued

Ref. No.	I H C Part No.	Lincoln Engr. Co. No.	Description	No. Used	Wt. Lbs.
...	60012 D	A-1218-1H	Bucket lubricator, with hose and coupler	1	19.000
...	60013 D	1217	Bucket lubricator, (less hose and coupler).	1	18.437
...	62352 D	81-368	Pump assembly.	1	9.000
1	61733 D	11128	Foot valve body.	1	.203
2	62574 D	66144	Foot valve check ball.	1	.062
3	62573 D	45-608	Foot valve disc.	1	.012
4	61732 D	11127	Foot valve collar.	1	.078
5	40630 D	A-35-020	Packing.	1	.003
6	40652 D	A-11-550	Piston	1	.072
7	40719 D	A-66-002	Ball	1	.005
8	40698 D	A-45-559	Piston disc.	1	.001
9	61738 D	A-62111	Pump plunger rod	1	.750
10	61737 D	A-61229	Pump tube.	1	.750
11	.....	50037	Cap screw, 1/4" N.C. x 7/16" .	3	
12	52745 V	66170	Cover plate washer	3	.001
13	62159 D	A-45-620	Cover.	1	1.500
14	61740 D	B-40-227	Pump casting	1	1.500
15	37290 D	5750	Button head fitting.	1	.125
16	40655 D	A-11-557	Pump outlet.	1	.266
17	53189 D	A-64-280	Handle	1	1.031
18	40638 D	A-10-472	Toggle pin	1	.031
...	.....	A66-031	Cotter, 3/32" x 1/2"	1	
19	40638 D	A-10-472	Toggle pin	1	.031
...	.....	A66-031	Cotter, 3/32" x 1/2"	1	
20	53193 D	90-271	Lever handle	1	3.000
21	61735 D	11283	Toggle pin	1	.047
...	.....	60078	Cotter, 3/32" x 5/8"	1	
22	61736 D	A-60041	Container.	1	9.750
23	55479 D	A-11-225	Cover screw.	3	.047
24	61739 D	A-81207	Foot valve	1	.500

When ordering, always use I H C Part Nos.

SPARE PARTS CATALOG

HOSE ASSEMBLY COUPLER FOR BUCKET LUBRICATOR

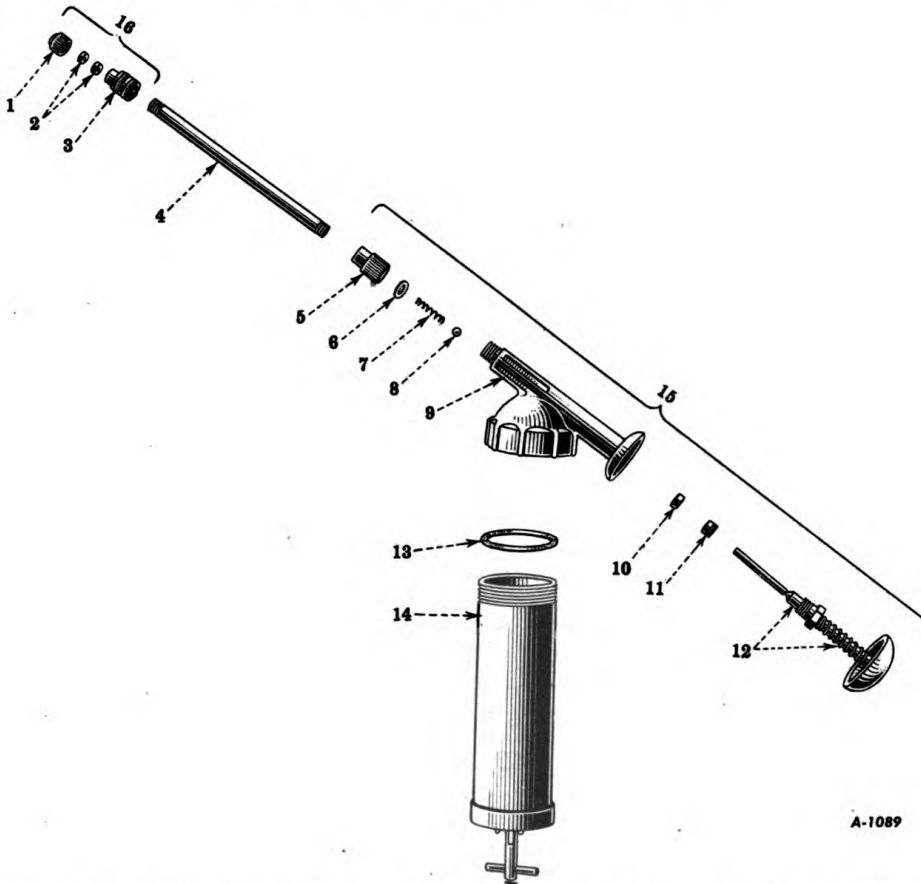


A-1088

Ref. No.	I H C Part No.	Lincoln Engr. Co. No.	Description	No. Used	Wt. Lbs.
...	36947 D	A-80-353	Swivel	1	.260
...	40728 DA	A-81-219-IH	Giant coupler.	1	.660
...	53192 D	A-81-220	Hose assembly, with coupler	1	
1	40649 D	A-10-618	Nozzle body plug	1	.063
2	40657 D	A-31-016	Gasket	1	
3	40648 D	A-10-617	Giant nozzle body.	1	.313
4	53187 D	A-11-137	Coupler adapter.	1	.375
5	40642 D	A-10-534	Swivel collar.	1	.043
6	40641 D	A-10-533	Swivel stud.	1	.090
7	40631 D	A-36-019	Cup leather.	1	.001
8	40703 D	A-48-080	Swivel washer.	1	.001
9	40713 D	A-56-014	Spring	1	.001
10	40646 D	A-10-541	Swivel body.	1	.100
11	40725 D	A-80-356	Hose fitting	1	.150
12	36946 D	A-79-060	Hose (5 ft.)	1	
13	40693 D	A-45-033	Washer	1	.001
14	40661 D	A-34-037	Giant packing.	1	.001
15	40636 D	A-10-450	Check seat	1	.010
16	40712 D	A-55-067	Spring	1	.001
17	40644 D	A-10-537	Plunger.	1	.020
18	40711 D	A-55-063	Plunger spring	1	.001
19	40700 D	A-48-077	Packing washer	1	.001
20	40628 D	A-34-039	Packing.	1	.001
21	40656 D	A-30-012	Gasket	1	.001
22	40640 D	A-10-528	Packing gland.	1	.090
23	53196 D	A-11-138	Handle	1	.090
24	40725 D	A-80-356	Hose fitting	1	.150
25	40647 D	A-10-551	Pin.	1	.001

SPARE PARTS CATALOG

LUBRICATOR (Hand Type)



Unnumbered parts in the illustrations are the same as corresponding parts shown with numbers.

Ref. No.	I H C Part No.	Lincoln Engr. Co. No.	Description	No. Used	Wt. Lbs.
...	Q 3794	No. 1020	Lubricator, complete (9 oz. capacity). . . .	1	2.250
1	39653 D	A-10-733	Nozzle cap	1	.012
2	39656 DX	A-34-050	Washer (set of 2).	1	.001
3	39652 D	A-10-539	Nozzle body.	1	.020
4	.....	A-67-020	Standard pipe, 1/8" (6" long)	1	
5	39875 D	A-10-453	Adapter with gasket.	1	.031
6	39655 D	A-33-018	Gasket	1	.001
7	39870 D	A-55-046	Check spring	1	.001
8	39659 D	A-66-011	Check ball	1	.001
9	39868 D	A-41-052	Pump body.	1	.530
10	39665 D	A-34-034	Packing.	1	.001
11	39651 D	A-10-492	Packing screw.	1	.001
12	39663 D	89-975	Plunger assembly	1	.220
13	39654 D	A-32-029	Gasket	1	.001
14	39661 D	B-81-903	Tube assembly.	1	1.250
15	39662 D	89-974	Head assembly.	1	.780
16	39800 D	A-5804-1	Nozzle, complete	1	.050

SPARE PARTS CATALOG

TOOLS

I H C Part No.	Description	No. Used	Wt. Lbs.
9534 D	Open end wrench (2-11/16") (optional with 2584 T)	1	11.000
11858 DA	Water pump wrench.	1	.156
19289 D	Hexagon socket wrench (9/16")	1	.219
19291 D	Hexagon socket wrench (5/8")	1	.312
19292 D	Hexagon socket wrench (3/4")	1	.430
19323 D	Socket wrench handle (combination offset and tee)	1	1.375
19324 D	Hexagon socket wrench (7/8")	1	.218
19325 D	Hexagon socket wrench (13/16")	1	.187
19326 D	Hexagon socket wrench (1")	1	.250
19327 D	Hexagon socket wrench (1-1/8")	1	.375
19328 D	Socket wrench set carrying case.	1	.906
19329 D	Socket wrench set (in carrying case)	1	4.093
20156 D	Square drain plug socket wrench (1/2")	1	.125
20157 D	Square drain plug socket wrench (11/16")	1	.172
25462 DA	Stem handled socket wrench (1-1/32")	1	1.875
25463 D	Stem handled socket wrench handle.	1	
25466 D	Spark plug wrench handle	1	.578
32941 D	Spark plug wrench (31/32")	1	.250
45579 DA	Magneto and spark plug gage.	1	.004
50092 D	Steering clutch pilot bearing retainer bolt wrench	1	.187
60012 D	Bucket lubricator with hose (Lincoln) A-1218-IH) (50 lb. cap.) (See detail list on page 5)	1	19.000
58920 DAX	Steering clutch compressor angle tool.	1	1.250
Q 1870	Cap screw, 5/8" N.C. x 1-1/2"	2	.191
Q 1858	Cap screw, 1/2" N.C. x 2-1/4"	2	.016
1326 E	End wrench (3/4 x 7/8")	1	.560
H 156	Oil can.	1	.250
Q 3794	Hand lubricator (9 oz.) (Lincoln) (See detail list on page 7)	1	2.250
2583 T	Hammer (1-1/2 lb.)	1	1.875
2584 T	Monkey wrench (21") (optional with 9534 D)	1	7.875
2587 T	Combination slip joint pliers (8")	1	.562
2588 T	Screw driver (5") (wood handle)	1	.312
50523 D	Tool box assembly.	1	9.719

GASKET PACKAGES

I H C Part No.	Description	No. Used	Wt. Lbs.
57307 D	Engine gasket package.	1	
57790 D	Chassis gasket package	1	4.250

When ordering, always use I H C Part Nos.

LUBRICATION GUIDE KIT (When Used)

I H C Part No.	Description	No. Used
11232 GT	Kit holder bracket, front	1
.....	Cap screw, 1/4" N.F. x 5/8"	3
.....	Hex. nut, 1/4" N.F.	3
.....	Lock washer, 1/4"	3
.....	Plain washer, 9/32" I.D. x 5/8" O.D. x No. 16 gage.	3
11233 GT	Kit holder bracket, rear.	1
.....	Cap screw, 1/4" N.F. x 5/8"	3
.....	Hex. nut, 1/4" N.F.	3
.....	Lock washer, 1/4"	3
.....	Plain washer, 9/32" I.D. x 5/8" O.D. x No. 16 gage	3
.....	*Lubrication Guide Kit (consists of the follow- ing parts:)	1
.....	Metal bound lubrication guide	1
.....	Lubrication check cards	10
.....	Waterproof canvas holder.	1

* - *Furnished by the Corps of Engineers.*

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
D				6982 D	6	4	\$6.00	9475 DX	6	3	\$3.00
2370 DAX	2	3	\$1.90	6984 DAX	6	4	8.00	9476 DX	6	3	3.50
2557 DAX	2	3	1.90	6985 D	2	1	30.90	9478 DX	6	3	30.25
3175 D	2	3	1.25	6986 D	2	1	20.65	9534 D	15	8	3.00
3202 DDRXA	4	11	11.75	6987 DA	2	1	5.50	9634 D	11	2	1.65
4222 D	4	11	.20	6988 DA	2	1	5.50	9637 D	14	1	.20
4253 D	9	1	.55	6990 D	2	1	.50	9638 DX	14	1	
4254 DA	9	1	.12	6992 DA	2	1	1.65	9641 DX	12	1	
4596 D	14	1	.12	6994 D	4	17	.55	9642 DX	12	1	
4819 D	4	8	.30	6995 DB	4	14	1.10	9646 D	11	2	
4926 DA	7	3		8000 DA	8	10	2.75	9650 D	5	2	
4988 D	4	3	3.00	8008 DX	4	9	4.15	10319 D	4	12	.07
4993 DA	4	12	1.50	8009 D	4	9	1.90	10429 D	2	1	.10
4994 DAX	4	12	1.75	8021 DAX	4	13		10722 D	6	3	.09
5024 DAR	11	3	.75	8023 DX	2	3	7.45	10951 D	4	3	.25
5025 DBR	4	3	1.10	8029 D	4	8	1.05	10961 D	4	9	.12
5027 DB	4	3	1.70	8045 D	4	18	3.30	11373 D	14	1	.12
5028 D	4	3	1.70	8055 DX	4	14	6.35	11657 D	2	3	.05
5051 DX	8	7	2.55	8061 DX	4	4	9.00	11858 DA	15	8	.12
5235 DA	13	4	2.20	8062 D	4	4	.60	13021 D	4	9	.01
5441 D	8	19		8063 D	4	3	1.65	13055 D	4	4	.0333
5715 D	12	3	5.75	8064 DAXA	4	4	104.00	13056 DA	12	2	
5723 DB	5	1	3.30	8064 DAYA	4	4	135.00	13056 DA	12	3	.16
5812 D	12	5	.40	8081 D	3	5	1.35	13083 D	4	3	.022
5813 D	12	5	3.55	8119 D	9	1	5.75	13115 D	14	1	.022
5815 D	12	5	.95	8120 DAX	9	1	14.00	13129 DA	12	3	
5818 D	12	5	.65	8221 D	8	5	.55	13129 DA	12	5	.10
5913 D	2	1	.50	8349 D	7	7	.95	13193 D	8	4	.03
5938 DAX	14	1	1.90	8352 DB	12	3	14.00	13194 D	8	4	.15
5957 DBX	4	11		8356 DY	13	3	13.00	13722 D	14	1	.022
5957 DBY	4	11		8357 D	13	3	3.20	13806 D	4	8	.05
5960 D	4	4	.95	8358 D	13	3	3.55	13839 D	4	13	
5977 D	4	5	.45	8361 D	14	2	.50	13839 D	4	18	.05
5980 D	4	5	15.65	8362 DA	14	1	2.20	13841 D	4	13	
6268 DX	9	2	8.00	8394 DX	3	3	3.00	13841 D	4	18	
6276 DX	9	2	2.75	8395 D	6	1	17.35	13842 D	4	13	2.45
6277 D	9	2	2.20	8396 D	6	1	2.75	13897 D	4	8	.004
6482 DAY	3	2	6.60	8397 D	6	1	2.75	14186 DA	4	7	
6483 DY	3	2	1.75	8413 DX	4	8	11.55	14186 DA	7	9	
6485 D	13	3	.55	8414 D	4	7	1.05	14186 DA	12	1	.05
6649 D	11	1	.45	8420 DX	4	11	38.25	14186 DA	12	3	
6783 DX	3	2	2.20	8425 DA	4	17	9.60	14187 DA	2	2	
6868 DCX	7	5	38.00	8426 DAX	11	2	2.05	14187 DA	5	1	.11
6869 DCX	7	5	38.00	8427 DX	11	2	1.65	15644 D	13	1	.40
6870 DA	7	5	11.95	8430 DA	6	4	2.75	15944 D	13	1	.05
6871 DBX	7	5	35.00	8431 D	6	3	3.20	16077 D	2	1	.12
6872 DBX	7	5	35.00	8432 D	6	4	1.90	16077 D	2	1	
6873 DAX	13	4	8.55	8433 DA	6	4	11.95	16445 D	8	2	
6874 DAX	13	1	13.45	8463 DDX	4	7	198.00	16445 D	8	2	.02
6875 DAX	13	1	13.45	8473 DAX	4	15	11.00	16445 D	8	3	
6878 D	13	1	2.75	8479 DBX	8	7	4.40	16518 D	8	2	.12
6879 D	13	1	43.00	8519 D	12	3	27.25	17053 D	14	1	.50
6880 DAX	13	1	7.15	8617 DX	11	1	1.35	17564 D	8	4	.22
6884 DAX	7	1	15.40	8679 DA	12	1	1.55	17565 DA	8	4	.12
6885 DAX	7	1	15.40	8680 D	12	3	.85	17700 D	14	1	.17
6886 D	7	1	16.00	8682 DX	12	3	1.90	17793 D	1	1	
6888 DX	7	7	38.00	8683 DX	12	1	3.95	17829 D	13	1	
6890 D	7	7	38.00	8684 DX	12	1	3.85	17829 D	13	3	.35
6894 DA	7	9	5.75	8685 DX	12	2	6.95	17829 D	13	4	
6900 DHX	7	3	291.50	8784 DA	6	3	55.00	18196 D	2	3	.022
6911 DB	7	7	28.60	8959 D	4	8	.65	18220 DA	12	3	.11
6912 DX	12	5	3.55	8962 D	7	8	28.00	18377 D	8	7	.05
6913 DA	7	3	6.35	8963 D	7	8	21.45	18507 D	9	2	4.90
6915 DA	12	5	3.85	8964 D	7	8	13.00	18510 D	14	1	9.20
6916 DA	12	5		8965 DX	7	5	41.00	18511 D	14	2	7.40
6917 DA	7	10	13.75	8966 DX	7	5	41.00	18539 D	4	3	.02
6919 DX	5	2	3.55	8967 D	7	8	11.50	18573 DA	13	1	.75
6921 DA	14	2	2.20	8968 D	7	8	11.50	18585 DA	7	3	
6922 D	14	2	2.00	8969 D	7	8	2.00	18585 DA	14	1	.12
6923 DBX	14	2	5.50	9118 DX	8	5	1.10	18746 DA	4	3	.05
6925 DB	14	2	1.00	9219 DX	7	7	8.50	18868 D	7	9	
6935 D	4	19	1.00	9220 DX	7	7	8.50	18868 D	14	2	.01
6963 DX	2	2	9.35	9269 D	4	12		19289 D	15	8	.25
6964 D	2	3	1.20	9270 DX	4	12		19291 D	15	8	.25
6965 DX	2	2	2.95	9323 DX	4	11		19292 D	15	8	.35
6973 D	12	3	12.90	9323 DY	4	11		19305 D	11	1	.17
6974 DA	12	3	7.15	9390 DX	8	7		19306 D	11	1	.02
941 D	14	2	.45	9456 DX	14	1	13.20	19323 D	15	8	1.15
				9458 D	14	2	2.00	19324 D	15	8	.40
				9446 DAX	11	1		19325 D	15	8	.35
				9447 DX	11	1					

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
19326 D	15	8	\$.40	27140 DDX	4	3	\$5.00	32576 DX	8	7	\$.17
19327 D	15	8	.45	27141 D	4	3	.07	32577 D	8	7	.12
19328 D	15	8	.45	27307 D	2	1	.17	32578 D	8	7	.12
19329 D	15	8	4.40	27311 D	3	2	.09	32581 DXA	8	7	.75
19574 D	13	1	.017	27445 DB	8	7	.03	32582 D	8	7	.05
20156 D	15	8	.40	27452 D	8	7	.40	32585 DA	8	7	.30
20157 D	15	8	.45	27618 D	3	4	.005	32586 D	8	7	.05
20289 D	2	3	.85	27618 D	4	15		32587 D	8	7	.03
20290 D	2	3	.90	27648 D	2	3	.12	32588 D	8	7	.03
20293 D	2	3	.17	27838 D	5	2		32604 D	8	7	
20296 D	2	3	.95	27927 DA	8	9	.07	32606 DA	8	7	.05
20299 D	2	3	.25	28428 D	3	6	.12	32685 D	4	3	.35
20300 D	2	3	.17	28428 D	3	8		32941 D	15	8	.45
20301 D	2	3	.05	28737 DX	4	11	.55	32942 D	4	11	.60
20303 D	2	3	.40	28772 D	4	18	3.85	33814 D	2	3	4.40
20306 DX	2	3	1.75	28781 D	4	13	.05	35089 D	7	1	.05
20308 D	2	3	3.65	28797 D	4	8	.12	35089 DA	13	4	.05
20308 D	12	3		28809 D	4	18	4.50	35132 D	13	3	.45
20585 D	2	3	.95	29340 D	3	4	.30	35149 DA	13	3	1.20
20586 D	2	3	.12	29501 DA	4	18	6.00	35252 D	12	3	
20586 D	11	1		29547 D	14	1	.12	35252 DX	12	3	.25
20841 D	12	5	.17	29565 D	4	7	.07	35691 D	8	7	
20887 D	14	1	.17	29873 D	3	4	.30	36092 D	8	8	.07
21259 D	2	3	1.90	29874 D	3	4	.35	36273 D	3	10	.20
21314 DX	3	1	.85	29898 D	1	1	.06	36796 DA	4	8	.17
21342 D	3	2	.03	29898 D	8	10		36946 D	15	6	6.50
21350 DXA	3	1		29899 D	8	2		36947 D	15	6	1.25
21388 DBX	3	1	.40	29899 D	8	3	.08	37063 D	3	10	.05
21393 D	3	2	.05	29899 D	8	4		37064 D	3	10	.20
21394 D	3	1	.05	29899 D	12	3		37072 D	3	10	.05
21409 DB	3	2	.85	29902 DX	8	7	.35	37075 D	3	10	.05
21559 D	14	2	6.40	30397 D	4	7	.09	37148 D	8	9	.05
21585 D	12	3	.12	30402 D	1	1	.30	37150 D	8	9	.70
21795 D	13	4	1.05	30402 D	8	10		37152 D	8	9	6.60
21839 D	2	3	.05	30402 DX	1	1		37165 D	4	17	.17
21969 D	12	3	.75	30402 DX	8	10	.30	37165 D	8	2	
22383 D	2	1	.03	30665 D	12	2	.05	37165 D	8	3	
23132 D	4	14	.40	30824 D	2	2	.03	37165 D	8	10	
23260 D	13	4	.85	30982 D	2	3	2.30	37290 D	13	1	.32
23261 D	13	4	.03	31119 D	13	1	1.20	37290 D	13	3	
23977 DA	8	2	.12	31121 D	8	9	.03	37290 D	13	4	
23995 D	8	2	.35	31238 D	5	1	5.20	37290 D	15	5	
24017 D	2	3	.35	31458 D	4	11	.35	37291 D	3	1	.015
24473 D	3	3	.45	31522 DX	3	7	.60	37291 D	3	4	
24603 D	3	2	.03	31522 DX	3	9		37323 D	4	18	
24805 D	8	5	.022	31536 DB	4	4	.70	37323 DX	4	18	.30
24855 D	8	3	.25	31636 D	8	7	.02	37634 D	2	3	4.40
24916 D	11	3	.35	31729 D	4	7	.35	37753 D	3	7	
24917 D	11	3	.05	32032 DXA	3	1	.10	37753 D	3	8	
24941 D	2	3	.10	32046 DX	3	7	.75	37976 D	3	12	.12
24943 D	4	11	.25	32046 DX	3	9		38026 DM	4	17	.22
24961 D	4	3	.12	32282 DCR	4	4	1.65	38026 DM	8	3	
24962 D	4	3	.07	32284 DA	4	4	11.40	38026 DMX	4	17	
24964 D	4	3	.09	32307 DB	4	11	.30	38026 DMX	8	3	.35
24965 DB	4	3	.50	32308 D	4	11	.03	38026 DMX	8	10	
25043 DB	4	3	1.25	32309 D	4	11	.08	38411 D	8	3	.03
25076 D	4	12	.02	32319 D	4	9	.03	38609 DA	3	1	.014
25082 DD	4	7	.85	32332 D	4	11	.35	39361 D	5	2	.015
25083 DCR	4	4	1.25	32333 D	4	11	.12	39401 D	4	11	6.00
25086 DA	4	7	.09	32349 D	2	3	.03	39422 D	4	11	.03
25090 DD	4	3	1.25	32370 D	4	8	.09	39423 D	4	11	.17
25091 DA	4	11		32444 D	4	4	.07	39577 DA	4	18	1.35
25092 DA	4	11	.05	32445 D	4	4	.05	39651 D	15	7	.15
25093 DA	4	11	.02	32447 DA	4	4	.25	39652 D	15	7	.20
25094 D	4	11	.05	32448 D	4	4	.25	39653 D	15	7	.25
25095 D	4	11	.45	32454 D	4	4	.14	39654 D	15	7	.10
25096 D	4	11	.08	32454 D	4	7		39655 D	15	7	.03
25115 D	11	1	.05	32466 DX	4	3	2.05	39656 DX	15	7	.20
25130 D	4	8	.05	32467 DX	4	3	2.05	39659 D	15	7	.03
25131 D	4	8	.40	32468 DX	4	3	2.05	39661 D	15	7	1.70
25132 D	4	8	.05	32468 DX	4	4		39662 D	15	7	2.25
25134 DA	4	12	5.00	32479 D	11	3	.17	39663 D	15	7	.75
25138 DAX	4	8	3.45	32482 DB	4	3	2.90	39665 D	15	7	.08
25140 DBX	4	8	7.90	32485 D	4	3	.06	39677 D	4	18	.25
25323 D	4	4	.14	32486 DAX	4	3	1.60	39756 D	4	7	.35
25352 D	4	13	.02	32493 D	8	9	.30	39757 D	4	7	.20
25462 DA	15	8	1.15	32569 D	2	2	.05	39761 D	4	7	.12
25463 D	15	8	.75	32572 DAX	8	7	.85	39762 D	4	7	.05
25466 D	15	8	.40	32574 D	8	7	.05	39800 D	15	7	.50
26916 D	4	11	.12	32575 D	8	7	.35	39810 D	4	7	.45
27129 DD	4	3	.90					39868 D	15	7	1.30

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
39870 D	15	7	\$.05	41608 D	6	3	\$.05	43113 D	4	11	\$.45
39875 D	15	7	.15	41619 D	6	4	.05	43189 D	8	11	.05
40216 D	8	13	.05	41768 D	12	1	.17	43192 DA	8	9	1.35
40255 D	8	13	.25	41827 D	3	12	.05	43194 D	5	1	.70
40329 DA	8	19	.01	41830 D	3	12	.17	43195 D	5	1	.16
40385 D	8	11	.45	41831 D	3	12	.05	43197 D	5	1	9.20
40386 D	8	11	1.90	41832 DBX	3	12	1.55	43197 DX	5	1	14.50
40388 D	8	11	.25	41842 D	7	7		43198 D	5	1	4.00
40390 D	8	11	.40	41842 D	7	8	.17	43199 D	5	2	.10
40395 D	8	11	.25	41842 D	7	9		43201 DA	5	1	
40397 D	8	11	.90	41853 DB	13	1		43207 D	5	2	.65
40399 DA	8	13	.25	41935 D	12	5	.17	43211 D	5	2	.10
40401 D	8	13	.15	41999 D	12	5	.09	43247 D	5	2	.017
40465 DX	14	1	.17	42000 D	7	3	.22	43248 D	5	2	.70
40466 DX	14	1	.17	42158 D	2	1	.25	43664 DA	12	5	.75
40628 D	15	6	.15	42175 D	12	1	.17	43712 DB	13	5	.03
40630 D	15	5	.35	42215 D	8	8	.12	45001 D	3	3	3.55
40631 D	15	6	.15	42219 D	4	11	.90	45003 D	3	3	.03
40636 D	15	6	.20	42288 D	7	3	1.10	45110 D	8	7	.03
40638 D	15	5	.15	42289 D	7	3		45148 D	8	7	.03
40640 D	15	6	.45	42289 D	9	2	.08	45149 D	8	7	.03
40641 L	15	6	.45	42290 D	7	3	.50	45285 DA	4	13	.30
40642 D	15	6	.20	42297 D	7	3	.35	45286 D	4	13	.17
40644 D	15	6	.35	42298 DB	5	1	.45	45293 D	6	4	.14
40646 D	15	6	.45	42383 D	3	7		45391 D	11	1	
40647 D	15	6	.05	42383 D	3	8	1.10	45537 D	9	2	.40
40648 D	15	6	3.00	42384 DXA	8	3	.75	45561 D	9	2	1.20
40649 D	15	6	.10	42385 D	8	3	.05	45579 DA	15	8	.05
40652 D	15	5	.40	42387 D	8	3	.55	45619 D	9	2	1.10
40655 D	15	5	1.00	42406 D	8	3		45620 D	9	2	.05
40656 D	15	6	.05	42406 DX	8	3	.35	45794 D	12	1	.09
40657 D	15	6	.03	42495 D	8	3	.40	45797 D	13	1	.05
40661 D	15	6	.25	42496 DX	14	1	.40	45976 D	4	8	.05
40693 D	15	6	.05	42511 D	14	1	.10	45977 D	4	8	.05
40698 D	15	5	.05	42512 DAX	14	1	3.40	45982 DX	2	3	2.75
40700 D	15	6	.05	42517 D	14	1	1.10	45993 D	2	3	.50
40703 D	15	6	.03	42518 D	14	1	.55	46053 D	4	9	.05
40711 C	15	6	.05	42547 D	1	1	.85	46054 DA	4	9	2.85
40712 D	15	6	.05	42605 D	2	1	1.00	46059 D	8	7	.03
40713 D	15	6	.05	42610 D	2	1	.85	46129 D	4	8	.17
40719 D	15	5	.03	42611 D	2	1	1.90	46184 D	8	7	.03
40725 D	15	6	.75	42613 D	4	17	.17	46212 D	11	3	.17
40728 DA	15	6	5.00	42687 DX	4	11	22.50	46213 D	11	3	.17
40753 D	8	14		42687 DY	4	11	25.30	46250 D	4	8	
40753 D	8	15		42688 DAX	4	12	3.70	46250 D	8	10	.09
40753 D	8	18		42690 DAX	4	12	4.30	46368 D	12	1	.09
40753 D	8	19		42694 D	4	11	.55	46583 D	8	10	.05
40881 DA	12	3		42695 DB	4	12		46584 DX	8	10	.50
40882 D	12	3	1.65	42717 D	4	7	.40	46606 DX	4	13	.85
40883 DB	12	3	3.30	42733 D	4	7	.12	46785 D	3	2	.007
40940 D	6	3	10.30	42739 DA	4	15		47244 D	9	1	.03
40942 DX	5	1	4.40	42739 DA	11	3	.17	47294 D	3	2	.12
40943 D	5	1	1.10	42746 D	11	3	.60	47408 D	3	1	.07
40945 D	5	2	.35	42747 D	4	3	2.30	47409 D	3	2	.03
40974 DA	5	1	.09	42748 D	4	3	.22	47413 DX	3	1	1.70
40998 DA	7	3	.30	42749 D	11	3	1.70	47413 DY	3	1	1.75
41162 D	7	3	.07	42750 D	11	3	.85	47417 DX	3	1	.55
41491 D	12	5	.17	42750 D	11	3	.85	47424 D	3	1	.03
41493 D	12	5	.17	42765 DA	8	9	3.25	47425 DX	3	1	.35
41495 D	12	5	.30	42766 D	8	9	1.60	47425 DY	3	1	.40
41496 D	12	5	.05	42767 D	8	9	.05	47427 D	3	1	.03
41497 D	12	5	.05	42772 D	8	8	.30	47428 D	3	1	.05
41498 D	12	5	.09	42791 DA	4	9	1.35	47428 D	3	1	.05
41499 D	12	5	.30	42833 D	3	7		47431 DB	3	1	1.00
41501 D	12	5	.30	42833 D	3	9	1.35	47432 D	3	2	.12
41508 D	12	5	.17	42877 D	4	5	.22	47453 DX	3	2	.12
41509 D	12	5	.05	42879 D	4	5	.12	47438 DA	3	2	.12
41512 DA	12	5	.70	42915 D	3	8	.12	47439 DAX	3	1	7.15
41519 D	12	5	.03	42916 D	3	8	.09	47442 D	3	2	.03
41521 D	12	5	.17	42917 D	3	7		47449 DAY	3	1	.90
41522 D	12	5	.17	42917 D	3	8	.17	47452 D	3	1	.05
41523 D	12	5	.17	42921 D	3	8	.30	47453 D	3	1	.05
41524 D	12	5	.17	42921 D	3	10		47454 D	3	1	.03
41574 DCX	8	2	5.50	42981 DA	11	1	.40	47461 D	3	2	.025
41597 D	5	2		42998 D	3	5	2.20	47462 D	3	2	.03
41597 D	11	2		43002 D	8	9	.12	47464 D	3	2	.07
41597 D	12	1	.15	43026 DB	4	12	109.50	47465 D	3	2	.05
41597 D	14	1		43035 D	3	6		47468 D	3	2	.03
41598 D	7	3	.30	43035 D	3	7	15.60	47470 D	3	2	.12
41599 D	7	3	.17	43035 D	3	8		47473 D	3	2	.05
41600 D	7	3	.05	43039 D	3	11	.12	47474 D	3	2	.03
				43040 D	3	11	.17	47475 DA	3	2	.17

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
47487 D	4	11	\$.088	49791 D	3	1	\$.03	50129 DA	2	1	\$52.25
47487 D	9	1	.088	49801 D	6	3	.17	50130 DC	2	1	124.50
47490 D	9	1	.17	49802 D	6	4	.05	50134 D	2	1	.09
47576 D	13	1	.50	49816 D	7	7	13.85	50135 D	2	1	.35
47772 D	7	10	.05	49817 D	7	7	13.85	50136 D	2	1	.30
47822 D	3	2	.22	49818 D	7	7	12.65	50137 D	2	1	.35
47868 DX	3	12	2.75	49819 D	7	7	11.20	50138 DX	2	1	.40
48138 D	4	8	.12	49820 D	7	7	10.80	50139 D	2	1	2.45
48173 D	5	1	10.00	49821 D	7	7	8.80	50140 D	2	1	2.45
48231 D	8	3	1.80	49835 D	7	9	.14	50144 D	2	1	1.35
48232 D	8	3	.55	49836 D	7	9	.03	50145 DA	2	1	12.65
48233 D	8	3	.45	49837 D	7	9	.03	50148 D	8	3	.85
48234 D	8	3	1.60	49838 D	7	9	.03	50160 DBX	4	3	63.25
48339 D	3	2	.03	49839 D	7	9	.05	50165 DX	4	17	34.00
48340 DA	3	2	.05	49840 D	7	9	.03	50166 D	4	17	.35
48341 D	3	2	.12	49841 D	7	9	.05	50234 D	3	12	.08
48342 DA	3	2	.03	49848 D	12	2	.17	50235 D	3	12	.08
48356 D	11	1	.35	49849 D	6	1	.65	50273 D	2	3	.05
48358 D	11	1	.17	49850 D	6	1	.07	50283 DAR	4	4	1.25
48359 D	11	1	.22	49857 D	6	3	2.20	50315 D	4	11	3.55
48472 D	3	1	.03	49864 D	6	3	1.35	50357 D	4	7	.55
48756 DA	4	12	5.10	49868 D	6	3	3.15	50360 D	3	3	.12
48757 D	4	12	5.10	49876 D	6	3	24.60	50362 DX	4	7	10.80
48759 D	4	11	5.75	49879 DA	6	3	.30	50363 DAR	4	7	10.15
48760 DA	4	12		49882 D	6	3	.22	50371 D	4	9	9.00
48761 D	4	12	6.35	49962 D	12	5	.85	50372 DX	4	9	2.75
48763 D	4	11	8.25	49963 D	12	5	.17	50374 D	4	9	3.70
48906 D	11	2	.17	49964 D	12	5	1.20	50375 D	4	9	3.00
48921 D	4	17	.95	49965 D	12	5	1.20	50376 D	4	9	.05
49026 D	4	7	.05	49966 D	12	5	.70	50377 DX	4	9	1.90
49090 DXR	3	1	9.65	49970 D	12	5	.17	50379 DAX	4	9	1.10
49091 DX	3	2	1.65	49971 DD	5	1		50392 D	5	2	30.25
49091 DY	3	2	2.55	49973 DA	5	1	6.35	50408 D	4	7	.03
49091 DZ	3	2	4.65	49974 D	5	1	4.15	50410 DA	4	4	
49092 D	3	2	.45	49975 D	5	1		50410 DA	4	7	.09
49093 DX	3	2	1.65	49975 D	5	2	.22	50410 DA	4	13	
49094 D	3	1		49976 DA	5	2	.10	50411 D	4	8	.12
49094 D	3	3	37.50	49977 D	5	1	2.20	50412 D	8	10	2.75
49125 D	3	1	.12	49978 D	12	5	.95	50423 DX	5	2	11.50
49359 D	3	4	.35	49983 D	7	10	.95	50424 D	5	2	.10
49416 DX	3	1	.30	49984 D	7	10	11.50	50426 DA	5	2	12.25
49417 D	3	1	.03	49986 D	7	10	1.45	50427 DE	5	1	102.00
49418 D	3	1	.03	49987 D	7	10	1.10	50432 DAX	5	1	9.60
49419 D	3	1	.03	49997 D	7	3	.12	50478 D	4	7	.17
49420 DX	3	1	1.35	49998 D	7	3	.17	50486 D	4	8	.30
49423 D	3	1	.03	49999 D	7	1	.22	50487 DX	4	7	8.65
49424 D	3	1	.05	50001 D	14	2	.35	50504 D	4	13	
49464 DA	4	17	1.85	50004 D	14	2	.95	50510 D	15	1	
49593 D	3	1	.12	50006 DA	14	2	1.50	50511 DX	10	3	2.45
49728 D	13	4	3.85	50009 D	14	2	.12	50512 DX	10	2	2.45
49729 DA	7	5	31.00	50010 DB	14	2	.12	50513 D	10	3	1.00
49732 D	7	5	.17	50011 DB	14	2	.12	50514 D	10	3	1.00
49733 DA	7	5	2.60	50012 DB	14	2	.12	50515 D	10	2	1.00
49734 D	13	3		50013 DB	14	2	.08	50516 D	10	3	6.00
49734 D	13	4	.22	50015 D	14	2	.65	50517 D	10	2	6.00
49735 D	13	1	.70	50016 D	14	2	20.65	50518 DX	10	3	4.15
49736 D	13	1	.12	50017 D	14	2	4.85	50519 DX	10	2	4.15
49738 DX	13	1	2.65	50018 D	14	2	.14	50520 DX	10	3	1.65
49739 D	13	1	.17	50021 D	14	2	.17	50521 D	10	3	.85
49740 D	13	1	10.75	50023 D	14	2	.03	50523 D	15	8	2.75
49741 DAX	13	1		50025 D	14	1	.30	50524 D	10	2	16.00
49741 DAX	13	3	.85	50026 D	14	1	.22	50525 D	10	3	16.00
49745 D	13	3	20.00	50027 D	14	1	.12	50527 DX	4	17	3.30
49746 D	13	3	21.30	50082 D	14	1	1.00	50528 D	4	17	.12
49748 DX	13	3	3.00	50083 D	14	2	.09	50529 D	4	17	.09
49749 D	13	3	.14	50085 D	14	1	.22	50532 D	4	17	.40
49759 D	13	5	.85	50087 D	14	2	.07	50533 D	4	17	.55
49760 D	13	5	1.50	50088 D	14	2	.65	50607 D	8	3	
49761 DA	13	5	.70	50090 DB	14	2	1.10	50607 DX	8	3	.60
49762 DA	13	5	.088	50091 DAX	4	19	2.25	50607 DX	8	10	
49763 D	6	4	.044	50092 D	15	8	.22	50620 D	8	9	14.30
49768 D	7	1	3.15	50096 DA	12	3	.45	50621 DX	8	9	3.65
49769 D	7	1	.17	50098 DA	12	3	.30	50622 DX	8	9	3.65
49771 DAX	7	1	13.00	50099 DAX	12	3	.35	50623 DX	8	9	3.65
49773 D	7	7	.50	50099 D	12	3	.22	50624 DX	8	9	3.65
49775 D	7	7	69.50	50103 DA	12	2	.03	50626 D	8	9	.09
49776 D	7	7	1.75	50104 D	12	3	2.75	50664 D	4	4	.07
49777 D	7	7	3.00	50117 DAX	1	1	5.75	50665 DX	4	3	3.00
49778 D	7	7	.17	50124 D	4	19	.35	50668 D	4	4	.03
49779 DX	7	7	.35	50125 D	4	19	1.20	50669 D	4	4	.22
				50126 D	2	1	.25	50670 DX	11	3	6.85

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
50672 D	11	3	\$.22	52332 D	6	4	\$81.50	53387 DX	8	8	\$.35
50673 D	11	3	.90	52336 DA	7	9	44.00	53388 DX	8	8	.35
50674 D	11	3	.09	52337 DA	7	9	44.00	53389 D	12	3	5.25
50675 DA	4	3	2.10	52343 DB	12	2	104.50	53401 DX	4	12	137.50
50677 D	4	4	.07	52344 DA	12	3	12.95	53402 DX	4	12	137.50
50677 D	4	14		52345 D	12	2	8.00	53410 DX	11	1	2.20
50678 D	11	3	.22	52347 DA	6	3	30.25	53411 D	11	1	.05
50682 D	8	8	.12	52348 D	6	3	1.90	53413 D	11	3	.70
50683 D	8	8	.45	52350 DA	13	5	1.20	53414 DX	11	1	.60
50683 DX	8	8		52351 DA	13	5		53415 DX	11	1	.60
50687 D	4	14	.18	52352 DA	13	5	10.75	53416 D	11	1	.55
50688 D	4	14	.15	52357 DX	6	4	93.50	53417 D	11	1	1.65
50688 D	4	15		52362 DB	7	5	93.50	53438 DA	6	3	16.50
50689 D	4	14	.20	52363 DB	7	5	93.50	53439 D	6	3	1.25
50689 D	4	15		52364 D	7	5	36.00	53440 D	6	3	6.60
50697 D	4	15	.45	52364 D	13	3		53444 D	6	3	4.00
50698 D	4	15	1.05	52365 D	7	5	37.50	53446 D	6	4	2.75
50705 D	4	15	.05	52365 D	13	3		53447 D	6	4	.17
50772 DX	1	1	.60	52366 D	13	3	.17	53447 D	6	4	
50784 D	3	10	.90	52367 D	13	3	10.45	53448 D	6	4	.55
50790 D	2	3	.05	52372 DA	14	2	1.05	53449 D	6	4	3.85
50801 D	8	7	.55	52374 D	14	2	9.35	53450 D	6	4	2.25
50802 D	8	7	.17	52375 D	14	1	9.35	53451 D	6	4	.35
50803 D	8	7	.05	52376 DX	14	1	21.75	53455 D	6	3	2.75
50807 D	8	7	.09	52377 D	14	2	4.65	53456 D	6	4	2.45
50822 D	12	2	.05	52378 D	14	2	7.45	53457 D	5	1	8.80
50826 D	4	7	.12	52379 D	14	1	17.85	53458 DD	8	7	25.30
50827 D	11	1	.17	52380 D	14	1	11.95	53459 DA	8	7	.05
50829 D	4	7	.12	52381 D	14	1	10.75	53560 D	4	7	.09
50841 DX	13	2	5.00	52382 D	14	2	16.80	53612 D	4	11	1.55
50842 DX	13	2	5.00	52384 D	14	2	1.35	53613 DA	6	4	1.90
50873 D	15	2	3.55	52386 D	14	2	36.40	53643 D	4	7	.07
50874 D	15	2	3.55	52387 D	7	3	.09	53672 DX	4	15	1.55
50877 DAX	15	2	4.15	52389 D	8	3	1.80	53673 DX	4	15	1.55
50880 D	4	5	27.35	52390 D	10	3	2.85	53675 D	6	1	5.35
50891 D	3	5	1.45	52392 D	7	3	.85	53709 D	14	2	.14
50892 DA	3	5	.17	52394 D	7	1	18.45	53710 D	14	2	2.45
50893 D	3	5	.70	52395 D	7	1	18.45	53717 DA	14	1	.12
50894 D	3	7	2.75	52396 D	6	1	.12	53836 D	8	7	.30
50894 D	3	9		52397 D	6	1	.12	53837 DX	8	7	.22
50895 D	3	5	2.00	52398 D	6	1	.14	53840 D	8	7	.12
50895 D	3	7		52399 DA	6	1	.10	53872 D	4	8	1.05
50895 D	3	8	2.05	52401 D	6	1	46.50	53973 D	7	10	24.75
50897 D	3	7		52403 D	11	2	.45	53976 D	7	10	.40
50897 D	3	9	2.00	52404 D	11	2	.17	53977 D	7	10	.45
50899 D	3	7		52405 D	11	2	.17	53992 DAX	7	5	12.35
50899 D	3	9	2.05	52406 D	11	2	.22	53993 DAX	7	5	12.35
50905 DAX	9	2		52407 D	11	2	.55	53994 DAX	7	5	14.85
50917 D	4	14	4.15	52408 DC	1	1	14.55	53995 DAX	7	5	14.95
51066 DBX	8	4	1.65	52412 DAX	15	1	12.65	54044 D	3	8	1.50
51074 DC	13	5	2.75	52419 D	6	3	.05	54064 D	3	8	.55
51205 D	4	13	.17	52435 D	3	12	.12	54086 D	11	1	1.00
51223 D	4	9	.05	52514 D	4	15	.03	54110 D	6	4	.03
51234 DA	4	15	.35	52515 DA	4	15	.22	54118 D	15	3	7.45
51268 D	9	1		52519 D	4	15	.17	54119 D	15	3	7.45
51269 D	9	1	.12	52520 D	4	15	.05	54121 D	15	3	.35
51271 D	9	1	.22	52605 D	4	7	.09	54124 D	11	1	.17
51329 D	11	1	.05	52606 D	4	7	.03	54125 D	11	1	.12
51431 DX	12	3	.70	52612 D	8	9	2.75	54158 D	4	4	.17
51515 D	4	9	2.45	52613 D	8	9	13.75	54259 D	4	17	22.00
51516 D	4	9	2.45	52621 DX	11	1	1.10	54267 D	4	17	3.30
51527 D	8	5	.03	52623 D	11	1	.05	54290 D	8	10	.10
51554 D	6	1	.17	52624 D	11	1	.12	54290 D	8	13	
51610 DB	5	2	16.75	52626 D	11	1	1.05	54291 D	8	14	.05
51611 DA	5	1	39.50	52855 D	8	4	.30	54293 D	8	13	1.70
51666 D	3	1	.12	53031 D	1	1	.003	54294 DAX	8	13	3.50
51667 D	3	2	.03	53079 D	8	7	1.00	54295 D	8	13	.60
51704 D	8	7	.07	53083 D	4	15	.60	54296 D	8	13	.05
51887 D	3	10	5.50	53136 D	8	8	.75	54297 D	8	13	.05
51888 D	3	10	3.00	53187 D	15	6		54298 D	8	13	.05
51889 D	3	10	2.00	53189 D	15	5	1.25	54299 D	8	14	.25
51891 D	3	10	1.00	53192 D	15	6	11.00	54306 D	8	14	.20
51892 D	3	10	.05	53193 D	15	5	1.25	54320 D	8	13	1.25
51893 D	3	10	.50	53196 D	15	6	.75	54326 D	8	13	3.60
51894 D	3	10	1.00	53233 D	12	3	20.00	54329 D	8	13	.30
51895 D	3	10	.20	53262 D	3	4	.45	54330 D	8	14	.95
51898 D	3	10	.05	53262 D	4	15		54331 D	8	14	.90
51970 D	3	10	.15	53263 DA	3	4	1.75	54332 D	8	14	.05
52033 D	2	1	.011	53264 D	3	3	2.75	54333 DA	8	15	.95
52128 D	8	10	.05	53380 D	4	3	21.50	54334 D	8	14	.40
52176 DC	11	1	.35	53386 DX	8	8	.40				

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
54335 D	8	15	\$.95	56471 D	14	2	\$7.25	60204 DA	13	5	\$8.80
54337 D	8	13	11.00	56472 D	14	1	27.50	60266 D	12	5	.17
54345 D	8	15	4.20	56475 D	12	5	.09	60267 DA	12	5	10.15
54346 D	8	15	.20	56476 D	12	5	.07	60430 DX	8	3	.70
54347 D	8	15	.10	56478 D	12	5	.22	60430 DX	8	10	
54348 DAX	8	15	2.90	56537 DX	8	7	.65	60740 D	8	18	1.40
54349 D	8	15	.25	56538 DX	8	7	.65	60805 D	1	1	.10
54350 D	8	15	.45	56542 DX	8	7	.12	60870 D	8	2	
54351 D	8	15	.30	56679 D	8	7	.35	60870 D	8	5	5.50
54364 DB	8	11	.05	56996 D	5	2		60871 D	8	5	
54365 D	8	11	1.25	57055 DX	3	7		60872 D	8	5	.95
54366 D	8	11	.90	57055 DX	3	9	.40	60876 D	8	5	.03
54367 D	8	11	.45	57056 D	3	7		60877 D	8	5	.15
54370 D	8	11	.75	57056 D	3	9	2.60	60878 DX	8	5	.95
54371 D	8	11	.10	57056 D	3	12		60912 DNS	3	7	
54372 DB	8	13	3.10	57068 D	4	17		60912 DNS	3	12	36.75
54373 DB	8	13	2.30	57068 DX	4	17	.40	60938 D	3	7	
54374 D	8	13	.40	57236 D	7	9	8.50	60938 D	3	8	.05
54411 D	8	14	.05	57240 D	7	9	3.85	61111 D	8	11	.10
54412 D	8	14	.05	57245 D	2	2	38.00	61115 D	5	2	.07
54413 D	8	14	.05	57288 D	12	1	.35	61127 D	5	2	.15
54416 D	8	14	.60	57307 D	15	8	6.50	61131 D	5	1	.25
54434 D	8	19	.15	57311 DX	3	7		61208 D	8	9	.05
54435 D	8	19	.15	57311 DX	3	8		61209 D	8	9	.05
54462 D	8	19	.10	57311 DX	3	11		61613 D	7	7	1.60
54481 D	8	15	.10	57312 D	3	11	.03	61645 D	3	9	.25
54486 D	8	4	.95	57313 D	3	11	.12	61732 D	15	5	.25
54491 DB	12	3	4.15	57314 D	3	2	.17	61733 D	15	5	.50
54520 DX	4	17	.65	57384 D	7	3	.35	61735 D	15	5	.30
54652 D	12	3	.12	57385 D	7	3	.35	61736 D	15	5	5.50
54692 DA	8	8	3.55	57484 D	4	9	30.55	61737 D	15	5	2.00
54857 DA	3	5	.95	57503 DX	8	15	.45	61738 D	15	5	1.40
54953 D	5	2	.05	57715 D	9	1	.05	61739 D	15	5	1.00
54964 D	4	15	.07	57733 D	13	1	.17	61740 D	15	5	2.00
54968 D	12	3	.12	57750 D	12	3	.03	61808 D	4	3	.70
55015 D	3	1	.03	57790 D	15	8	6.60	61813 D	3	7	.10
55338 D	7	9	.30	57926 DX	3	1	6.35	61813 D	3	8	
55354 D	11	1		58253 D	4	4	.17	61909 D	8	13	
55361 D	8	13	.10	58458 D	4	3	.05	61911 D	8	13	14.60
55371 DAX	5	1	10.80	58835 D	8	7	.09	61917 D	8	15	.10
55428 DA	8	18	.05	58836 D	8	7	.05	61918 DX	8	15	53.50
55445 D	7	5	2.75	58837 D	8	7	.07	61956 D	8	15	.10
55446 D	7	5	.05	58840 DX	8	7	.35	61957 D	8	15	.10
55467 D	3	7		58843 DX	8	7	.40	61958 D	8	15	.15
55467 D	3	12		58859 DX	8	7	.45	61959 DX	8	14	.30
55479 D	15	5	.12	58920 DAX	15	8	.85	61962 D	8	15	.15
55748 D	11	2	.07	58997 D	4	7		61963 D	8	14	3.65
55749 DAX	4	17	.90	58997 D	6	3	.55	61965 D	8	14	.25
55750 D	11	2	.35	59119 D	7	3	.85	61969 D	8	14	.05
55752 D	1	1		59241 D4	8	7		61970 D	8	15	.10
55752 D	3	8	.40	59480 D	4	7	.17	62115 D	8	14	.90
55780 DA	3	3	.05	59481 D	4	8	.05	62118 D	8	14	.10
55806 D	14	2	8.80	59482 D	4	7	.17	62120 D	8	14	.05
55855 D	3	1	.03	59483 D	4	7	.35	62121 D	8	14	.15
56005 D	12	3	.90	59484 D	4	8	.20	62123 D	8	14	.05
56006 D	12	3	.09	59485 D	4	7	.35	62124 D	8	15	.50
56007 D	12	3	.30	59541 D	7	8	.35	62125 D	8	11	18.75
56008 D	12	3	.05	59542 D	7	8	.15	62126 DY	8	11	10.40
56009 D	12	3	.05	59543 D	7	8	.15	62129 D	8	11	.05
56010 D	12	3	.22	59544 D	7	8	.12	62159 D	15	5	.75
56011 D	7	3	.35	59545 D	7	8	2.60	62191 D	8	17	84.00
56012 D	12	1	1.35	59546 D	7	8	2.60	62193 D	8	14	12.00
56013 DX	12	3	.40	59547 D	7	8	.60	62194 D	8	14	4.75
56014 D	7	3	.07	59548 D	7	8	1.15	62195 D	8	14	5.40
56016 D	12	2	1.35	59549 D	7	8	6.50	62196 D	8	14	.65
56017 D	12	3	.12	59550 D	7	8	1.80	62197 D	8	14	.65
56018 D	12	3	6.00	59551 D	7	8	.10	62198 D	8	14	.05
56019 DX	12	2	.65	59708 D	8	15	.22	62199 D	8	14	.05
56020 D	12	3	8.00	59996 DX	5	2		62200 D	8	18	13.75
56021 DAX	7	3	21.50	60012 D	15	5		62203 D	8	19	.15
56066 D	3	2	3.85	60012 D	15	8	27.50	62204 D	8	18	
56101 D	12	3	2.30	60014 DAX	8	2	.65	62204 D	8	19	.10
56107 D	4	15	.17	60023 SX13	8	3		62205 D	8	17	
56113 D	8	13	.10	60023 DX13	8	10		62205 D	8	18	.05
56148 DX	8	2	.85	60023 DX13	8	13		62205 D	8	19	
56149 DX	8	3	.90	60094 D	3	1	.65	62206 D	8	18	.05
56278 D	3	7		60143 DAX	8	3		62207 D	8	19	.05
56278 D	3	8	.03	60143 DAX	8	10		62208 D	8	18	.15
56291 D	8	9	2.75	60144 DX	8	10	.35	62209 D	8	18	.15
56469 D	14	2	.14	60145 DAX	8	3	.85	62210 D	8	18	.30
56470 D	14	1	.55	60145 DAX	8	10		62211 D	8	18	.05

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
62213 D	8	17	\$26.50	63763 D	3	7	\$.05	G			
62214 D	8	17	10.90	63763 D	3	8					
62217 DX	8	17	2.25	63884 D	4	13	.95				
62218 D	8	17	.20	63887 DX	15	2	54.45				
62219 D	8	17	.65	63889 DX	15	2	11.00				
62220 D	8	17	.05	63890 DX	15	2		G 3754	4	19	\$.02
62221 D	8	17	2.10	63986 D	4	7	14.50	G 3792	2	3	.12
62222 D	8	17	.85	64161 D	8	19	.10	11232 GT	15	9	
62223 D	8	17	.05	64163 D	14	1	.05	11233 GT	15	9	
62224 D	8	17	.10	64368 DX	4	12		H			
62225 DX	8	17	1.75	64384 D	4	12					
62227 D	8	17	.20	64385 D	4	12					
62228 D	8	17	.15	64388 D	4	12					
62229 DX	8	17	6.25	64391 D	4	11					
62233 D	8	18	1.60	64440 DA	4	12	22.75	H 156	15	8	.15
62235 D	8	18	.10	64456 DA	4	12	91.00	H 4213	11	2	.35
62236 D	8	17	5.25	64458 D	4	11	57.00	3405 H	4	4	1.00
62237 DX	8	17		64459 D	4	11		6838 HA	3	7	
62242 D	8	19	.05	64493 D	6	3	12.65	6838 HA	3	8	
62243 DX	8	19	1.75	64495 D	6	3	66.00	15033 H	11	2	.50
62246 DX	8	17	.90	64543 D	11	1		15041 H	11	2	
62247 D	8	17	.15	64544 D	11	1		15041 H	12	1	.05
62248 D	8	18	.10	64545 D	11	1		15041 H	12	5	
62249 D	8	17	.05	64603 D	14	2	.75	17462 H	6	3	15.80
62250 DX	8	19	.75	64604 D	14	2	.03	18575 H	14	1	2.85
62253 D	8	19	.50	64606 D	14	2	2.20	21407 H	12	5	.007
62254 D	8	19	.20	64607 D	14	2	.40	21444 H	5	2	.007
62255 DX	8	19	1.65	64608 D	14	2	.15	21491 H	14	2	.005
62259 D	8	19	1.10	64609 D	14	2	.03	21555 H	6	4	.024
62260 D	8	19	.20	64623 D	14	1	3.55	25038 HA	8	7	.05
62261 D	8	19	.20	64625 D	14	1	3.55	25038 HA	8	8	
62262 D	8	19	.10	64627 D	14	1	3.55	27166 H	5	2	
62263 DX	8	19	1.15	64628 D	6	1		29939 H	3	8	.12
62264 D	8	19	.10	64628 D	14	2	55.75	31538 H	5	2	2.75
62265 D	8	19	.05	64630 D	14	1	5.15	38763 H	4	3	.033
62267 D	8	18		64631 D	14	1	18.00	41229 H	3	10	.003
62267 DX	8	18	1.40	64632 D	14	2	.09	47415 H	4	17	.016
62268 DX	8	18	1.10	64801 D	6	3		47415 H	6	4	
62270 D	8	17	.50	64802 D	6	3	.20	48716 H	3	10	.003
62271 D	8	17	.05	64803 D	6	3	.20	48716 H	4	15	
62272 DX	8	18	2.25	64815 D	7	3	.09	49425 H	3	11	.019
62274 D	8	18	.10	64816 D	6	3	.20	50203 H	3	7	.05
62275 D	8	18	.10	64817 D	6	3	.08	50203 H	3	8	
62276 D	8	18	.10	64820 D	6	3	.55	50539 H	3	10	.05
62302 D	3	6		64924 D	6	3		64022 H	3	11	.01
62302 D	3	7	.10	64959 D	8	13	.45	64931 H	3	7	.90
62302 D	3	8		64960 D	8	13	.45	64931 H	3	8	
62352 D	15	5	12.25	64961 D	8	13	.90	66340 H	3	10	.45
62493 D	3	3	.05	65103 D	13	5		67980 H	8	18	.004
62573 D	15	5	.10	65265 D	13	5		67980 H	8	19	
62574 D	15	5	.25	65534 D	3	7		75238 H	14	1	5.60
62578 D	4	11		65534 D	3	8	.95	91406 HA	2	1	.08
62598 D	7	8	193.00	65534 D	3	8	.95	91406 HA	2	3	
62622 D	8	14	.05	66360 D	8	2	.14	K			
62625 D	8	18	2.05	67117 D	4	17	3.40				
62626 D	8	18	.05	67227 D	4	3	5.00				
62627 D	8	18	.05	67350 DX	14	1					
62628 D	8	18	.40	67870 D	8	14	.05				
62633 D	8	18	.10	67936 D	4	1		11669 K	5	2	4.25
62637 D	8	19	.05	67937 D	4	1		N			
62638 D	8	19	.05	67938 D	4	1					
62639 D	8	19	.05	68274 D	4	1					
62640 D	8	19	.05	68631 D	12	5					
62641 D	8	19	.05	E							
62642 D	8	19	.05					N 32202	5	2	.05
62643 D	8	19	.05					P			
62644 D	8	19	.05								
62645 D	8	18	1.70								
62648 D	8	18	1.70	E4-212	3	2	.05				
62780 D	14	1	.06	E4-216	3	1	.05	PO 9696	4	12	.06
62780 DX	14	2	.20	E4-226	3	1	.05	Q			
62781 D	14	1	.05	E4-294	3	2	1.30				
62782 D	14	2	.05	E4-295	3	2	.09				
62863 D	4	8		E4A-305	3	2	.05				
62866 D	4	7	.10	E4A-324	3	1	.17				
63228 D	12	1	.60	E4A-351	3	1	.35	Q 397	3	5	.005
63229 D	12	1	.60	E4A-352	3	1	.35	Q 1652	14	2	.02
63230 DX	12	1	.80	E4A-353	3	1	.60	Q 1753	3	8	.013
63282 D	4	12	.02	E4A-372	3	2	.05	Q 1756	4	15	.014
63294 D	4	12	13.00	E4A-546	3	1	.05	Q 1764	4	15	.022
63295 D	4	12		1326 E	15	8	.40	Q 1771	7	3	.015

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price
	No.	Page			No.	Page			No.	Page	
Q 1773	4	8	\$.017	Q 1852	2	1	\$.059	Q 1909	5	2	\$.025
Q 1774	5	1		Q 1852	4	8		Q 1909	6	3	
Q 1774	8	8		Q 1852	6	3		Q 1909	10	2	
Q 1774	8	9		Q 1852	7	3		Q 1909	10	3	
Q 1774	12	5	.017	Q 1852	13	4	.063	Q 1909	11	2	.025
Q 1784	4	14		Q 1852	14	1		Q 1909	14	2	
Q 1784	12	1		Q 1853	6	4		Q 1909	15	2	
Q 1798	7	5		Q 1853	10	3		Q 1909	15	3	
Q 1798	10	2	.019	Q 1854	2	1	.063	Q 1910	4	14	.025
Q 1798	10	3		Q 1856	4	8		Q 1910	4	15	
Q 1799	4	11		Q 1856	4	13		Q 1910	14	2	
Q 1799	10	2		Q 1856	14	2	.072	Q 1911	4	7	.042
Q 1799	10	3	.021	Q 1857	3	12		Q 1911	4	8	
Q 1800	2	1		Q 1858	15	8		Q 1911	5	2	
Q 1800	3	8		Q 1860	1	1		Q 1911	6	1	.042
Q 1800	4	7	.021	Q 1862	2	2	.082	Q 1911	6	4	
Q 1800	4	9		Q 1864	6	4		Q 1911	7	1	
Q 1800	4	17		Q 1864	8	5		Q 1911	7	5	
Q 1800	6	3	.021	Q 1866	4	13	.134	Q 1911	12	5	.042
Q 1800	6	4		Q 1866	4	17		Q 1911	15	2	
Q 1800	7	3		Q 1870	6	3		Q 1911	15	5	
Q 1800	8	2		Q 1870	7	1	.098	Q 1912	12	5	.06
Q 1800	10	2	.023	Q 1870	15	8		Q 1913	4	5	
Q 1800	10	3		Q 1871	6	4		Q 1913	7	1	
Q 1800	14	1		Q 1871	15	2	.104	Q 1913	7	5	.002
Q 1800	15	1	.023	Q 1872	6	3		Q 1913	12	5	
Q 1801	4	19		Q 1872	13	1		Q 1914	15	2	
Q 1801	7	10		Q 1873	7	1	.111	Q 1915	3	10	.002
Q 1802	1	1	.023	Q 1874	5	1		Q 1916	3	8	
Q 1802	2	1		Q 1875	15	2		Q 1916	4	8	
Q 1802	3	8		Q 1884	7	3	.116	Q 1916	4	15	.002
Q 1802	4	8	.023	Q 1885	7	5		Q 1916	8	2	
Q 1802	4	11		Q 1887	4	5		Q 1917	4	15	
Q 1802	4	17		Q 1888	6	4	.149	Q 1918	2	3	.002
Q 1802	8	5	.025	Q 1888	15	2		Q 1918	3	8	
Q 1802	8	10		Q 1889	7	1		Q 1918	3	10	
Q 1802	8	13		Q 1890	7	9	.157	Q 1918	4	15	.002
Q 1802	14	2	.025	Q 1890	9	2		Q 1918	6	3	
Q 1804	2	1		Q 1891	7	8		Q 1918	6	4	
Q 1804	2	2		Q 1894	7	8	.165	Q 1919	2	3	.003
Q 1804	4	7	.027	Q 1894	13	1		Q 1919	3	5	
Q 1804	4	11		Q 1895	7	5		Q 1919	3	10	
Q 1804	14	2		Q 1897	7	1	.22	Q 1919	4	7	.003
Q 1805	8	3	.027	Q 1901	2	3		Q 1919	4	15	
Q 1806	3	1		Q 1901	3	8		Q 1919	5	1	
Q 1806	3	3		Q 1901	4	3	.233	Q 1919	5	2	.003
Q 1810	4	9		Q 1901	4	15		Q 1919	7	3	
Q 1813	12	1	.033	Q 1901	11	3		Q 1919	8	7	.007
Q 1814	11	1		Q 1902	8	14	.007	Q 1919	8	8	
Q 1816	4	8		Q 1902	8	19		Q 1919	8	9	
Q 1820	4	9		Q 1902	12	3		Q 1919	10	3	.004
Q 1820	8	10	.065	Q 1903	2	3	.01	Q 1919	11	1	
Q 1820	8	13		Q 1903	4	4		Q 1919	11	3	
Q 1830	3	5		Q 1903	4	15		Q 1920	12	1	
Q 1832	4	18	.032	Q 1903	5	1	.01	Q 1920	1	1	.004
Q 1834	12	3		Q 1903	8	7		Q 1920	2	2	
Q 1845	10	3		Q 1903	8	9		Q 1920	2	2	
Q 1846	7	3		Q 1903	11	1	.01	Q 1920	3	1	.004
Q 1846	8	3	.047	Q 1904	3	5		Q 1920	3	3	
Q 1846	10	3		Q 1904	3	12		Q 1920	3	5	
Q 1847	3	8		Q 1904	4	14		Q 1920	3	8	.013
Q 1847	10	2	.051	Q 1904	10	3	.01	Q 1920	4	3	
Q 1847	10	3		Q 1905	3	5		Q 1920	4	7	
Q 1848	3	10		Q 1905	4	3		Q 1920	4	8	
Q 1848	4	7	.051	Q 1905	4	4	.013	Q 1920	4	9	.004
Q 1848	4	17		Q 1905	4	7		Q 1920	4	12	
Q 1849	4	19		Q 1905	4	19		Q 1920	4	14	
Q 1849	6	3		Q 1905	4	3	.013	Q 1920	4	17	
Q 1849	12	1	.055	Q 1905	8	3		Q 1920	4	19	.004
Q 1849	12	3		Q 1905	9	1		Q 1920	6	3	
Q 1849	13	4		Q 1905	10	2		Q 1920	6	4	
Q 1849	14	2		Q 1905	10	3	.013	Q 1920	7	3	
Q 1849	15	3	.055	Q 1906	11	2		Q 1920	7	5	.013
Q 1850	2	3		Q 1906	3	8		Q 1920	7	10	
Q 1850	4	4		Q 1906	4	8		Q 1920	8	2	.013
Q 1850	4	17		Q 1906	10	2	.013	Q 1920	8	3	
Q 1850	7	3	.055	Q 1906	10	3		Q 1920	8	5	
Q 1850	8	3		Q 1906	11	2		Q 1920	8	10	
Q 1850	12	3		Q 1906	15	1	.025	Q 1920	8	13	
Q 1851	15	2	.059	Q 1909	3	8		Q 1920	9	2	
				Q 1909	4	19					

(Prices are subject to change without notice.)

NUMERICAL INDEX

Part No.	Section		Price	Part No.	Section		Price	Part No.	Section		Price														
	No.	Page			No.	Page			No.	Page															
1920	10	2	.004	1925	7	1	.01	4017	4	7	.022														
1920	10	3		1925	7	2		4017	9	2															
1920	11	1		1925	15	2		4017	14	1															
1920	11	3		1927	4	5		4018	4	12															
1920	12	1		1927	6	4		4020	10	2															
1920	14	1	.004	1927	7	1	.017	4020	10	3	.02														
1920	14	2		1927	7	3		4042	7	5															
1920	15	1		1927	7	5		4043	2	2															
1921	3	5		1927	7	9		4046	4	13															
1921	4	18		1927	7	9		4050	7	1															
1921	12	3		1927	7	9		4075	3	3															
1922	1	1		1927	9	2		4076	6	4															
1922	2	1		1927	12	5		4078	13	3															
1922	2	2		1927	13	1		4120	7	7															
1922	2	3		1927	15	2		4125	7	9															
1922	3	5	.005	1929	4	5	.027	4134	7	5	.198														
1922	3	8		1929	7	1		4146	7	1															
1922	3	10		1929	7	5		4149	7	7															
1922	4	4		1929	7	7		4164	7	5															
1922	4	8		1929	7	8		4166	4	5															
1922	4	9		1929	7	9		4166	7	5															
1922	4	13		1929	7	10		4167	7	5															
1922	4	17		1930	7	10		4168	7	5															
1922	4	19		2505	3	12		4184	7	7															
1922	5	1		3615	4	7		4184	7	8															
1922	6	3	.005	3615	5	1	S	5015	11	2	.05														
1922	6	4		3615	6	4		SA 3215	13	1		.085													
1922	7	3		3615	7	1							ST 202	9	2	4.80									
1922	7	5		3615	7	9							ST 205A	2	3		3.65								
1922	8	3		3615	9	2							ST 205	12	3			3.65							
1922	8	5		3615	12	1							ST 214	14	1				2.85						
1922	8	13		3615	12	3							ST 219	14	1					9.20					
1922	8	14		3617	12	2							T	3	4						.03				
1922	10	2		3617	12	3																1924 T	4	15	.90
1922	10	3		3617	12	3																2583 T	15	8		4.50
1922	12	1	3618	12	3	2584 T	15				8											.35			
1922	12	3	3621	12	3	2587 T	15	8	.25																
1922	12	5	3621	12	5	2588 T	15	8		.007															
1922	12	5	3625	2	2	4167 T	3	2			.03														
1922	13	2	3625	2	2	4167 T	3	3				.013													
1922	13	4	3625	5	1	5312 T	4	9								.60									
1922	13	4	3625	5	2	7220 T	14	1									.02								
1922	14	1	3627	5	2	9982 T	4	18					.02												
1922	14	2	3628	2	3	1924 T	3	4						.03											
1922	15	2	3659	2	3										2583 T			15	8	.90					
1922	15	3	3794	15	7										2584 T			15	8		4.50				
1924	3	8	3794	15	8				2587 T						15			8	.35						
1924	6	4	4000	6	3				2588 T	15					8			.25							
1924	7	5	4000	6	4				4167 T	3	2				.007										
1924	12	2	4001	3	10				4167 T	3	3	.03													
1924	13	3	4012	4	8				5312 T	4	9					.013									
1925	3	10	4013	4	7				7220 T	14	1						.60								
1925	4	7	4014	3	5				9982 T	4	18		.02												
1925	4	8	4016	1	1	1924 T	3	4	.03																
1925	5	1	4016	2	1					2583 T	15			8						.90					
1925	5	2	4016	3	8					2584 T	15			8							4.50				
1925	6	3	4016	10	2					2587 T	15			8					.35						
1925	6	4	4016	10	3					2588 T	15			8				.25							

(Prices are subject to change without notice.)

